

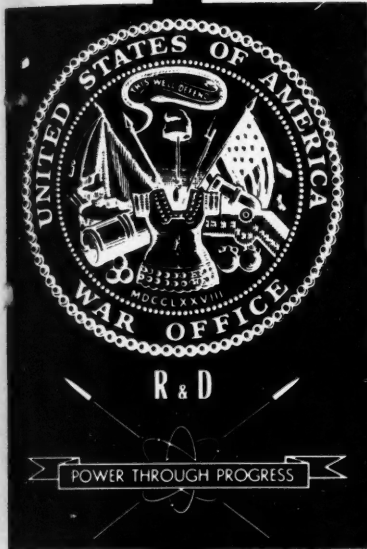
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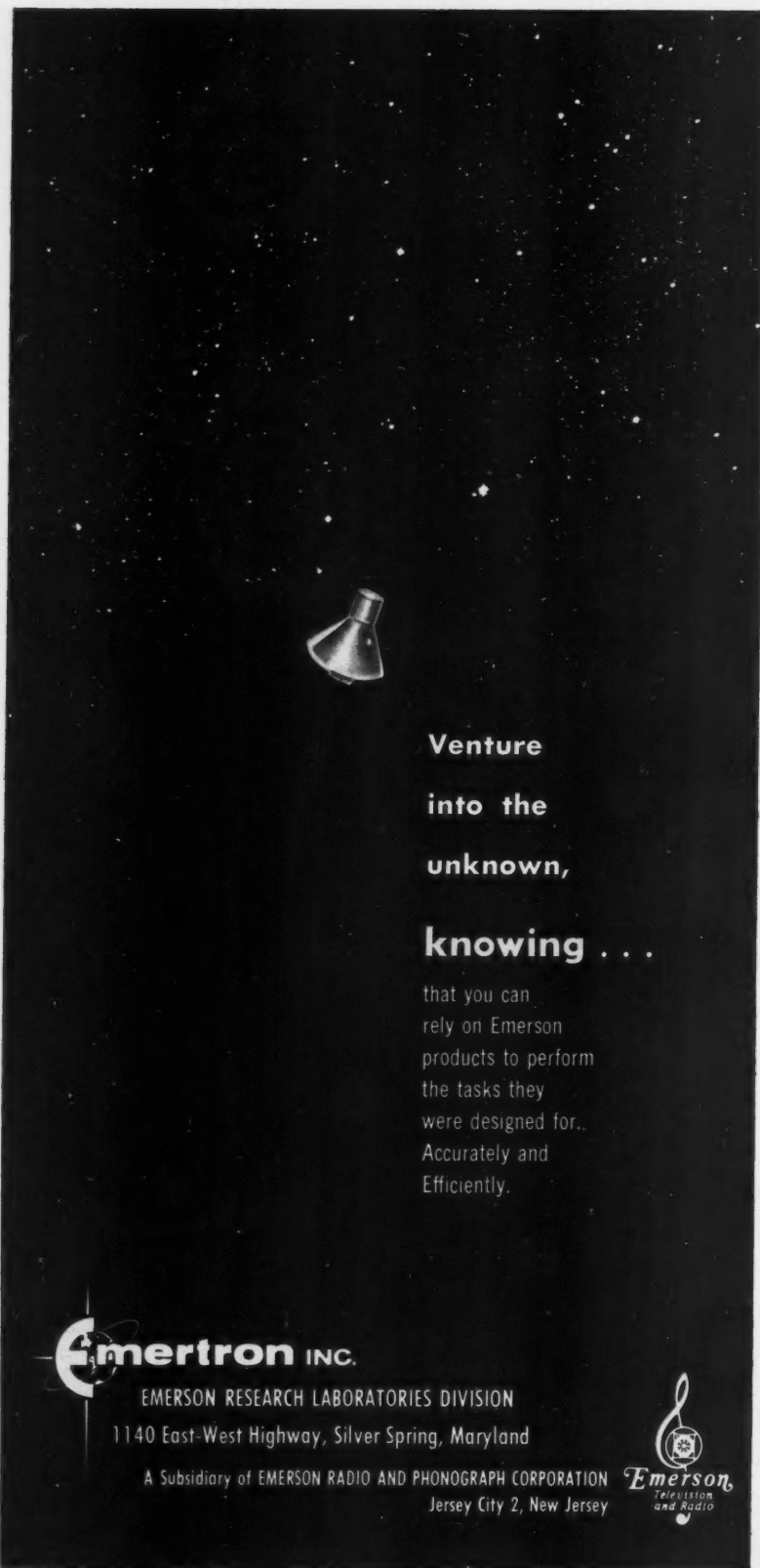
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## DATA MAGAZINE October 1960

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### OCTOBER 1960 COVER

During Project MAN maneuvers at Fort Benning, Ga., soldier demonstrates new Army mine detector while M-60 tank waits behind him.

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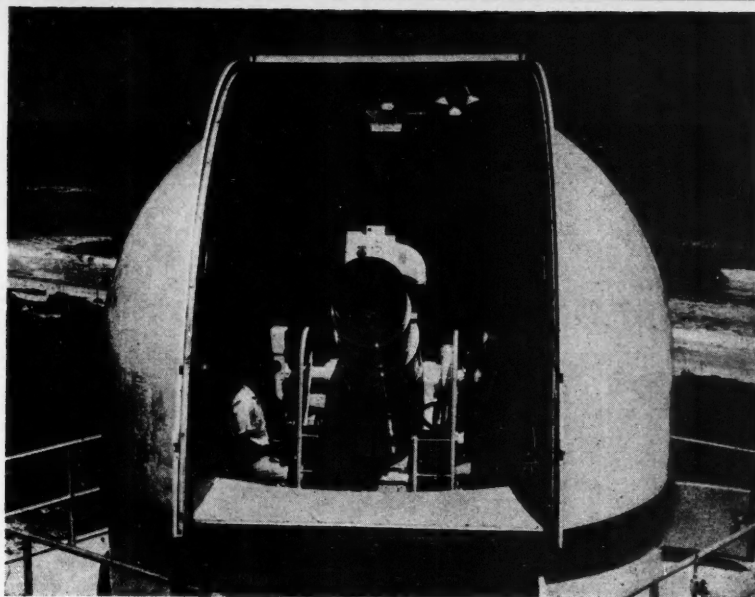
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# DATAGRAM

## MISSILE DEFENSE SYSTEM STUDIES

Six feasibility studies have been initiated, with awards totaling \$1½ million, to find a suitable Field Army Ballistic Missile System. This is in line with the Army's expressed need to find a missile system capable of moving with and protecting the Army in the field from the threat posed by a variety of ballistic and guided missiles. ///DOD/

## SUPER-SIZE SOLID FUEL BOOSTERS SOUGHT

NASA has selected 3 firms to undertake preliminary design studies on boosters for vehicles weighing from 1 million to 7 million lbs. Although small (\$225,000 each), these 3 contracts are the first issued by NASA for anything approaching a super-size booster. ///NASA/

## NASA FACILITIES FOR INDUSTRY SATELLITES

NASA Chief Glennan has offered boosters, tracking facilities as well as all the other items required to launch a satellite — at cost to industry in order to allow them to carry out their own satellite programs. Latest entrant in the race to be first company in space is Hughes, with a payload weighing less than 100 lbs. They join several other companies well along in plans to launch their own satellites. ///NASA/

## IMMEDIATE REPEAT SHOT FOR SAMOS INTENDED

AF is planning an early repeat shot of SAMOS reconnaissance satellite, pending determination of cause for failure of 11 Oct launch. Most sources believe that the next attempt will come toward the end of November. ///DATA/

## NEW SOLAR CELL IS RADIATION-RESISTANT

The dvlpmt is a significant advance, as solar cells are the primary source of electrical power for satellites. The cells were dvlpd by Army scientists at Ft Monmouth, and may lead to the production of radiation-resistant electronic devices. ///DOD/

## FUNDS RELEASED FOR 4 ICBM SITES

The Air Force has unfrozen funds totalling \$250 million for the construction of ICBM launch bases. Malmstrom AFB has greenlight for MINUTEMAN sites; Little Rock AFB, McConnell AFB and Davis-Monthan AFB have go-ahead for TITAN launch base construction. ///DATA/

## NEW TRACKER RECORDS SATELLITE TUMBLING

Dvlpd by Raytheon, the tracker records changes of reflection from the satellite while optically tracking it. It gives continuous and instantaneous tracking of the satellite. Primary aim of the electronic-optical unit is to provide data on tumbling satellites, so that solutions to this problem can be found. This will increase usefulness of communication satellites and provide increased safety factor for later manned vehicles. ///EN/



## AERONAUTICS AND ASTRO COORDINATING BOARD

NASA and DOD recently announced the establishment of The Aeronautics and Astronautics Coordinating Board. Mission is to assure coordination of aeronautics and space programs. Primary aim within this mission is to avoid duplication, but the board will also identify problems and problem areas and attempt to increase the exchange of information between activities having similar missions, or working in similar areas. ///NASA/

## NEW USE FOR LIGHT INTENSIFIERS

Tests are underway to evaluate the use of light intensifiers, which would allow the Army driver to maneuver at night with the use of a TV screen. With magnification, the screen will show an object at 1000 ft with clarity equivalent to an object at 10 ft. It is planned to use this system on closed vehicles, such as tanks and other armored vehicles, although the system is adaptable to any type land vehicle. Tests are being conducted at Aberdeen Proving Ground, Maryland. ///EN/

## TWO NEW METHODS OF FUEL STORAGE TESTED

Army Engineers are now using a huge ice reservoir, 100 ft beneath the Greenland Ice Cap, for storing some 30,000 gallons of diesel oil. Fuel oil stored in this manner can be left for years. It is believed that the quality of the oil is actually increased, as moisture content is eliminated, as is foreign matter. Nature's own process to accomplish this is freezing. ///DOD/

Meanwhile, the Navy offers a challenge to the Army's ingenuity. In a recent test the Navy sank 50,000 gallons of oil enclosed in a weighted, pillow-shaped rubber bag. The location is marked with a floating fuel-dock. This method of fuel storage affords protection from enemy bombing tactics, as well as from natural phenomena including hurricanes, fires, etc. The system also cuts costs by avoiding high rental rates. Depth is limited to under 100 ft, but improvements are being sought to increase the versatility of this method of fuel storage. ///Navy/

## GRENADE LAUNCHER BY ARMY

With max range of 400 meters, the new grenade launcher is intended to increase the firepower and independence of action of the Infantry platoon. Weight is 6 lbs. ///Army/

## MIDGET MOTOR

This mighty midget will fit in a cubic inch of space - with room to spare, and produce 1/3 hp. It weighs only 4 ounces, and is 1/100 the size of a standard electric motor developing equal power. Produced by Bendix Research Labs, it is designed to control missile antennas as they track moving targets. ///ISA/

## AIR CUSHION TRUCK DESIGNED

The latest entry in air cushion vehicles would weigh 2 tons, travel 5 ft above the ground with a top speed of 40 mph. It has twin forward props, washing downward and to the rear, and twin props to the rear to aid forward movement. The vehicle was designed by Aeronutronic Div of Ford Motor Co. ///DATA/

## FEEDBACK DATA

SIRS:

The August issue of DATA was gratefully received. As it arrived on Saturday, I was certainly happy to have my own copy. My husband sat down immediately with his, and I with mine, and we proceeded to read it from cover to cover. Needless to say, I was interested in every word.

I do take exception to the statement, however, that "... the Captain, who has never lost his Texas drawl through all of this ..." etc. Having been brought up in an altogether German community and priding himself in the fact that he is the only Annapolis graduate to have taken English for his foreign language, he surely never had any drawl to keep or lose. In fact, by meeting him during his third year at Annapolis, I confess to having contaminated his speech with a Boston accent which he has retained more in our travels than I. This always fills me with

nostalgia to hear him speak, for though I have not retained the accent, I am still the Yankee gal from Massachusetts at heart.

Thank you again for your kindness—I find the DATALOG an invaluable reference in keeping up with the news.

CHARLOTTE BERG  
(Wife of Captain Winfred E. Berg, Navy Astronautics)  
2417 Coventry Road  
Alexandria, Virginia

\* \* \* \*

SIRS:

This organization conducts classes in government contracting. I believe your service is excellent and I am calling the attention of my students to it.

PAUL R. McDONALD  
Procurement Associates  
P. O. Box 565  
Glendora, California

\* \* \* \*

SIRS:

I would like to have a copy of the ASW issue of DATA maga-

zine dated July 1960. As a student officer at the Naval War College, I find much information in this issue which will be of use to me in some research work I intend to conduct.

If you can provide any additional information or suggestions for procuring more material on U. S. industry's concern with the ASW problem, I would appreciate that also.

The article in the July 1960 issue of DATA concerning the report of the ASW Committee of NSIA refers to a three-volume report issued following the meetings in Rochester. This states that two volumes are unclassified. I would like to know where I could obtain the complete three-volume report.

D. M. SHOWERS  
Captain, U. S. Navy  
U. S. Naval War College  
Newport, Rhode Island

### Brief message from the publisher:

There are a lot of charlatans and opportunists in Washington in the Defense business—men who charge unreasonably high fees for performing simple tasks just because they happen to be physically located in the District of Columbia and can read the Defense phone book, others who rewrite the DOD news releases and call their resultant work an "exclusive" R&D newsletter, and publishers who prostitute their editorial content for advertisers and give their magazines to people who never requested them.

Knowledge of these practices fill me with disgust. No advertiser dictates to DATA. Ours is a paid circulation magazine and within its pages I proudly publish the best R&D, organizational and marketing information I can obtain from qualified people in various Defense fields. Within the limits of my advertising and subscription revenue I attempt to make each succeeding issue of DATA a better, more useful book than the one before it.

—Murray Queen-Smith

OCTOBER 1960

Volume 5

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Number 10

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## THE WEIGHTY PROBLEM OF WEIGHT

One of the most effective means developed by our society for the solution of problems that promote discomfort and mental squirming, is to make a determined effort to ignore the matter. This is singularly ineffective in relationship to the impersonal viewpoint of science; the laws of science, however, often bear little weight in the political-government arena.

In the tumultuous early days of the age of space, there occurred a great gnashing of the collective teeth in respect to the demonstrated ability of the Soviet Union to hurl payloads of substantial weight into orbit about the earth, onto the moon, around the moon, and past the moon into the forbidding banishment of solar orbit. This was, indeed, the heart of the criticism hurled at the Administration that condemned this nation's space program—or rather, lack of space program. Even the 184.3-pound weight of *Sputnik I* was sufficient in comparison to VANGUARD to produce astonishment and disbelief in our higher "pure scientific" and government circles. Then, with the ponderous bulk of succeeding payloads and carrier rockets pushed into spatial orbits, the hue and cry exploded to such volume that it became necessary for none other than the President to comment on this barrage of misguided criticism.

The President and his many, many advisors would have had the nation believe that the matter of weight, where payloads were concerned, for guided-missile warheads and space vehicles, was entirely out of proportion to reality. From the lofty vantage of government, we were informed that the *Russians were required, in fact, were forced, to produce giant rocket motors in order to compensate for their crude, inefficient, backward electronics systems!*

We did not need large rockets, came the word from On High, because of our superiority in not only miniaturization, but in subminiaturization. We could squeeze out of ten pounds of electronic gimmickry more than the Russians might glean from a thousand pounds. Never mind that Russian satellite orbits were astonishingly excellent, or that the precision of the lunar probes was nothing less than astounding—the way to solve the problem of light payloads for the United States was to repeat, again and again and again, that no problem existed. Therefore, why worry?

On this line of thinking, the situation could well have been explained with the following statement: "*Although the Soviet Union leads the United States in the development of powerful rocket boosters, America maintains its lead in such vital areas as subminiaturization. Otherwise, it would have been impossible for this country to have built a space program so much smaller than the one Russia has.*"

Logic is a wonderful thing.

Many months passed since the initial furor, and the American space program moved ahead with some truly remarkable feats. Our satellites erupted out of the atmosphere with a pleasing regularity, our precision of orbit was truly marvelous, and we were smashing down

barrier after barrier. The military even threw up a satellite of truly respectable size, and in terms of weight MIDAS finally exceeded the payload of *Sputnik III* (not IV or V). The problem of weight moved from the headlines to the back pages, and finally out of the newspapers entirely and into the technical journals, which no one reads except those people who already know what are in the journals.

The solution to the problem of weight of warhead and payload was bought by the *public*—simply, that there was no problem to begin with, and that weight really doesn't matter.

Of course, the basis of the argument emphasized heavily the ICBM. Why did we need a giant rocket, when the ATLAS could carry a payload all the way to target—a payload measured in destructive force, and not in instruments. ATLAS, it was argued, could do any task that might ever be conceived in relationship to the ICBM.

But is this true? The unhappy answer seems to be No. We are now stressing, in terms of the ICBM, the development of a so-called SUPER TITAN, which can lift along the ICBM trajectory a truly stupendous warhead payload—in terms of *weight*. But if ATLAS could do the job, as could the original TITAN design, why do we suddenly need larger, heavier, bulkier payloads? When did the reality of 1957, 1958 and 1959 suddenly change?

It seems that there are many sides to the ICBM story, that the ICBM in respect to the ATLAS and TITAN can *not* lift the full hydrogen bomb warhead—in comparison to what can be carried by the B-52, for example. Then there began to creep into the papers, and especially in the trade magazines, the news that the Russians appeared to be developing a "shotgun warhead." Instead of a single bomb contained in the re-entry package, the warhead would hold several nuclear, or thermonuclear, warheads; as the re-entry vehicle plunged toward its target, these would scatter outward and fall in a shotgun pattern into the target area, virtually assuring (assuming basic trajectory was accurate) serious damage and perhaps destruction of the target. Or there might be only the single warhead, and a whole flock of decoys.

What tells the still-nonexistent anti-ICBM missile which is the real warhead? And if each missile can lob anywhere from three to a dozen nuclear warheads down upon the target, how many anti-missile missiles do you launch at each incoming warhead? This should make for some marvelous mathematical legerdemain to be presented to hapless John Q. Public.

Of course, no one seems to connect the explanations that weight is not important, to the programs called SATURN, SUPER-SATURN, NOVA, and other gargantuan space vehicles. Their primary purpose: to lift enormous payloads into space.

If the truth be known, we do not need these expensive, bulky, giant space vehicles.

**Subminiaturized spacemen will solve all our problems.**  
— MARTIN CAIDIN



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DATA, the Government R&D Digest, contains a complete treatise each month on a different Government activity.

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JAN	ARDC
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APR	Federal Aviation Agency
MAY	German American Defense
JUN	Air Material Command
JUL	Navy Anti-Submarine Warfare Pro.
AUG	A.F. Electronics Program
SEP	Army Signal Corps
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NOV	Army Ordnance Corps
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PETER HACKES  
NBC News Commentator

## DEVELOPMENTS IN BOOSTERS

by Peter Hackes/DATA

**I**N the military budget there's an item of  $5\frac{1}{2}$  billion dollars for missiles and missile development. And the Space Agency (NASA) will get millions more for work on big vehicles to boost big satellites into space. As time goes on, this budgetary item will increase—to the point where we just can't afford to do what's necessary (let alone to catch up with Russia)—just to keep us where we are.

At the moment, at least 10 to 20 percent of the cost of each missile and space vehicle take-off is in the boosters. That is, the huge rockets which give the vehicle its first push off the ground. Some of these boosters—like ATLAS and THOR—run into the millions. Each time an ATLAS is fired downrange at Cape Canaveral, for example, even if the shot is successful and lands where it should, the first stage booster burns up as it re-enters the atmosphere. The same is true for satellite and space probe boosters—and some of them approach the half-billion dollar mark.

As the space vehicle gets bigger (for example, ones like SATURN which will use a cluster of 8 THOR-JUPITER engines as its first stage) the price of even one test firing becomes almost prohibitive.

Thus (out of necessity) there has been born a school of engineers busily at work redesigning launch-

ing boosters so they can be returned and used over again. "It just doesn't make sense," says Air Force development chief, Lieutenant General Roscoe Wilson, "It's like loading a jet airliner with passengers and flying it—without first test-flying it—from New York to Los Angeles and then throwing away the entire airliner when it arrives."

Researchers are now working on several plans to return and reuse these expensive boosters. The civilian space agency is devising retractable wing-type wing flaps to guide one back into the earth's atmosphere, where it would be taken in tow by a plane, and later released so it could make a radio-controlled landing. Another method gaining popularity in backstage discussions is the parachute recovery combined with an air snatch—that is, a grappling boom from a plane would hook onto a drag parachute from the booster and tow it back to its launching site, at which point it would be lowered by a larger chute (or possibly transferred to a helicopter) for landing.

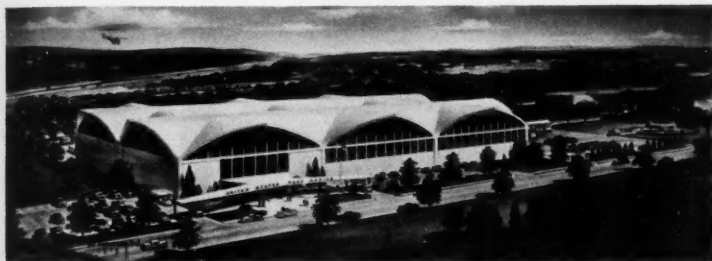
Much work is being done to develop a returnable satellite with wings, or with extra little jet engines. There's talk, for instance, of putting collapsible wings on later models of the Mercury space capsule for finer control of re-entry.

*But the really big thinkers are contemplating a manned booster rocket—a huge thing which would take along its own pilot.* In other words, this booster would first deposit a satellite or manned space vehicle in orbit, and then would be flown back to earth by the pilot himself. It would have to be a big one—at least a million pounds of thrust—and would have to protect its pilot from space radiation, unbelievably high take-off forces, and the heat of re-entry. There would be one other advantage to such a system (it's pointed out). This booster with wings could be ferried under its own power from the assembly line to its launching site.

So far, we're only scratching the surface in this area. But as one space researcher told me "Your son not only will be able to ride into space—he may be able to ride back again in the same booster that launched him."

*Mr. Hackes' space-age comments are heard regularly on the NBC Radio series "Emphasis".*





*Architectural rendering of new post office typical of style to soon be followed throughout America. Post offices will be located in suburbs with easy access to automotive, rail and air transportation.*



**T**he U. S. Post Office Department has decided to quit being a government agency and to become an industry.

This, in a nutshell, is the post office story.

Uncle Sam has launched into the biggest expansion, modernization and improvement program in its postal history.

Actually, it is much more than just this . . . it is a revolution.

#### MOVING CONSUMER GOODS

Time was when the local post office was a cozy institution where everyone gathered not only to get or send their mail but to stop and chat with one another. Things moved in a leisurely, folksy

## Modernization of the Post Office

*Post offices have been redesigned to be more modern, bright and efficient.*



fashion. "But today we are an industrial operation," a post office official told DATA. "We couldn't escape this if we wanted to. We are in the business of moving consumer goods."

#### HOW CHANGE CAME ABOUT

The big change has come about since World War II. With so many boys in the service, families got in the habit of writing more. And when the boys got back there were acquaintances to write to spread out all over the country, and sometimes across the sea as well.

But during the war not only letters but packages were mailed too. While the boys appreciated receiving sentimental notations from home they also didn't mind getting parcels that might be filled with anything from fudge to flashlights. And the habit of sending parcels as well as reading matter through the mails has been growing ever since.

There have been other factors that have come along, enhancing post office

*by Harold Helfer/DATA*

patronage. Plane travel, for instance, has broadened our travels, given us more contacts with which to keep in touch. The trend toward more banking and checking accounts means more bills paid by mail. The increased emphasis on advertising has meant more and more handbills, pamphlets, brochures invading the mails.

#### AVALANCHE OF MAIL

All of this has meant a great and unparalleled avalanche of mail, some 62,000,000,000 pieces a year, to be exact. And this mighty mountain of letters and packages grows mightier and more tremendous almost with each passing day, as our population expands and business continues growing more and more postal-minded.

Our per capita mail volume has almost doubled since the war. Twenty years ago each person in the United States received about 200 pieces a year.

contemplating the use of missiles to deliver mail. Mail already has actually been so delivered. In a successful experiment, a Navy sub at sea sent a missile loaded with mail 200 miles away to a point on the Florida coast. Postal leaders foresee the day when a missile with mail will take off from say, Long Island, and, after a trip through the cosmo regions, land in the San Francisco area only minutes later.

#### POSTAL R&E

The Post Office Department has a research and engineering division, and it has never been busier, not only trying to keep up with, but ahead of, things, and the welcome mat is most definitely out for industry to "come aboard" and lend a hand whenever and wherever it can.

In effect, the post office has been a sleeping giant. It has aroused itself like Rip Van Winkle and realizes that old

A rather typical case in point is Grand Rapids, Mich. This bustling community has had a post office with a loading platform that will accommodate four trucks. Now it is getting a new set-up that will simultaneously take care of 84 mail vehicles!

#### P.O. SEEKS NEW STATUS

As one postal official told DATA: "Today when the post office seeks a new location in a community it is after the same sort of site as Sears-Roebuck would be interested in. We are just as much a business and industry now as any business and industry."

The post office even thinks in these terms now. Its main facilities in a locality it refers to as a "wholesale operation," its substations as "retail outlets."

The trouble with the general picture now though is that post offices that seemed to do the job all right not so many years ago have simply become



*Helicopter mail service has been successfully tested in Chicago, L. A., New York and other cities. Greatly expanded use of helicopters for mail service is planned.*

Today it is 350 pieces. And, if the present trend continues, this ratio will be doubled in a couple of more decades.

#### MEETING THE GROWTH

It is to meet this anticipated growth as well as the current logistic problems that the post office department has launched into this major face-lifting and overhauling program.

#### TWO-PART APPROACH

Basically, this is divided into two parts: (1) *One is to provide for itself and its patrons more accommodating and practical quarters.* (2) *The other is to provide faster and more efficient service between mailing points.*

#### MISSILE MAIL

And, as far as the Post Office Department is concerned, the sky's the limit . . . but not forgetting outer space, either. The postal people are actually

ways have become quaint, that it has—willy-nilly—whether anyone particularly likes it or not, entered a new kind of world. And those who go along with the bestirred Rip now will find themselves on the ground floor of things.

#### DOWNTOWN LOCATIONS NOT WORKABLE

In many cases, it is because they are eschoned in some central downtown location, which seemed like a fine idea once, but now, with today's traffic problems and the general flow of things, is likely to be a decided handicap. Also, many post offices now simply don't have enough space or the proper spread of it, to do an adequate job.

So post offices throughout the land are now being moved to outlying sections of towns (always with airport and railroad availability in mind, as well as favorable ground vehicular travel) or given a thorough modernization job where they are, if that is at all practical.

"outmoded plants." Either location-wise or in the facility set-up, and often on both counts, they simply can't do an effective job now.

#### PROGRESS

Already, some 2500 U. S. post offices either have been renovated or moved. Postmaster-General Arthur Summerfield and company have included some 12,500 more post offices in this sweeping program. The Post Office Department is prepared to do the job in five years, although budget realities may delay it for a few more years. And many, perhaps most, of the remaining 15,000 post offices not included in this program will find themselves incorporated into this modernization and relocation program as soon as the current program is over. It will be a continuing matter.

#### NEW LOOK IN P.O. BUILDINGS

The new post offices, in many cases,

will have an entirely new look from anything out of the past. They will present shiny facades of glass and pinepanelling. Many will be air-conditioned. They could easily be mistaken at first glance for some modern book store or souvenir shop or perhaps even a roadside eatery. The reason for this "new dress" is two-fold. The post office doesn't see why it shouldn't be as attractive as it can be. But, also, the Post Office Department prefers to lease its buildings and it makes economic sense for it to be in presentable and personable quarters which could be easily turned over to another tenant should the post office decide to vacate.

#### NEW MACHINERY BEHIND THE WINDOWS

But even more important than the post office's new look is what's going on behind its stamp windows and weighing scales, what makes it tick inside. It is moving inexorably into a world of

example, will require a working area the size of two football fields! Machines will be involved that will be able to automatically sort 18,000 letters an hour, sending them to 300 destinations.

#### P.O. WANTS MORE MACHINES

The post office wants more and more of these machines and it wants better ones. Its mechanical sorters reduce the number of operations required to get a letter to its destination from about a dozen when handled by human sorters to about two or three with machines. But it would like to get it down to one simple over-all machine. Its "reading" machine can only do its job with typewritten addresses . . . it would like a machine that can "read" handwritten ones.

#### FACSIMILE MAIL

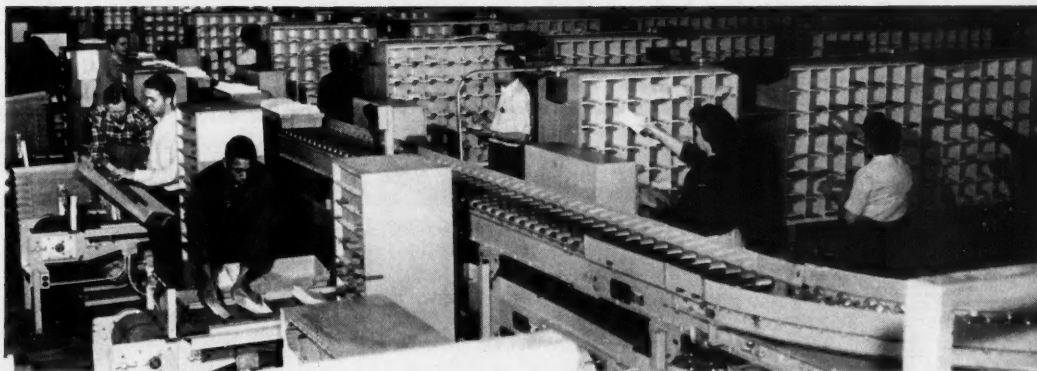
Perhaps the most spectacular bit of postal business around the corner is the

United States the following day, no matter where that point might be.

As far as the post office is concerned, the method of achieving this is incidental to the goal itself. It couldn't care less whether the mail went by oxcart or missile, just so the mail reached its destination in quickest and most practical fashion and, in any case, within 24 hours.

#### ONE POSTAL RATE

The post office foresees the day . . . and before too long . . . when there'll be only one postal rate with *how* the mail is delivered left up to the judgment of the post office. As a matter of fact, this is sort of in operation today. You may not know it but if you put an airmail stamp on a letter that doesn't necessarily mean it goes by air . . . not if the post office figures it will get there more quickly by train or truck. Conversely, letters with only a four-cent



More machines, better layout mean speedier handling of our letters.

automation.

It already has begun. There are now already mechanical letter and packaging sorting machines, an electric eye which can cancel the stamps of 25,000 letters in an hour, a culling machine which "distinguishes" the various types of mail and sends them to their proper places. There is even a machine that can "read" addresses, that can send letters along their proper routings simply from the impulses it gets from the addresses.

The Detroit post office is scheduled to get 28 mechanical letter sorters and work has begun to give the nation's capital "the world's most mechanized post office," with six miles of various types of mail conveyors, and the motors and electrical systems to energize them, already installed. And at two national extremities . . . at Providence, R. I., and Oakland, Calif., new postal buildings are being constructed to test giant new machines. One electronic brain, for

facsimile mail. Soon it will be possible to send a letter from Washington that will be duplicated electronically in New York or Chicago just minutes later. In the beginning, this service probably will be limited to use by government agencies but it is expected to spread to general use and between many geographical points in the nation.

The project is well advanced. The one thing of chief concern is to make sure of the "sanctity" of the mail, to be sure that the system will be so automatic that no human being will have to glimpse a mail patron's letter in order to transmit it.

#### OVERNIGHT DELIVERY

The big overall goal of the Post Office Department is overnight delivery mail. That is to say, you can mail a letter or package from any point in the United States and expect it to be delivered to some other point in the

stamp on them are sometimes sent by air if there is space aboard a plane and it isn't going to add up to any more of an expense to the government anyway.

#### SUMMARY OF THE STREAMLINING

"In the world today communication is everything," the postal people will tell you. "In this atomic-missile area, a few minutes difference in the receiving of some information could be a matter of life or death, the difference between survival and calamity. The U. S. Post Office, as the lifeblood and the hub of this nation's communication sphere, intends to prove itself worthy of this era."

This may sound a little lofty but there's no doubt that the Post Office Department is determined to sweep out its cobwebs and turn itself into a streamlined, up-to-the-minute operation.

Business and industry may consider this as a special delivery invitation to join in on all this. ■

# DATA Interviews

## Vice Admiral John Hayward

Deputy Chief of Naval Operations for Development

**Question: Do you think it's possible for the Navy to loan target submarines to prime contractors for use in their own R&D ASW programs?**

**Answer:** Prime contractors have been able to obtain some submarine target services either through investigative projects established by the Chief of Naval Operations at the request of the technical Bureaus', or by direct contact with Fleet Forces, such as Destroyer Development Group 2 at Newport, R. I., Submarine Development Group 2 at New London, Conn., and Destroyer Development Group Pacific at Long Beach, Calif. The loan of a submarine to industry for target purposes is not impossible, but does present major problems. For example:

Unlike bailment aircraft, the only submarines which might be available for loan are World War II submarines held in the Reserve Fleet. In general, these submarines have had many years of service, and would require a major hull and machinery overhaul before they could be safely operated in the submerged mode. It is extremely unlikely that the cost of such overhaul could be absorbed by a contractor.

A submarine on loan to a contractor would be subject to Coast Guard Regulations applicable to private vessels concerning provision of life-boats and other safety devices. Obviously, it would be very difficult and costly to design and modify a submarine to satisfy such requirements.

A submarine on loan to a contractor would have to be completely demilitarized. This would include removal of torpedo tubes and other special equipment. It would be costly.

In viewing the world situation, the requirement placed on the Navy to provide fully effective operating forces to support National Policies, the Navy is currently unable to provide and man a submarine for the exclusive use of a prime contractor. It is not anticipated that this situation will change in the foreseeable future.

**Q. Admiral Hayward, would it be possible for more contractors to use Navy Department underwater testing facilities?**

**A.** Yes, it is possible for more contractors to use Navy underwater testing facilities. In the past the requirement for such use has been extremely small, and has generally been limited to contractors having a contract involving the design, development or production of underwater equipment requiring testing. Such contractors have regularly worked very closely with Navy laboratories and test facilities. Recently, there has been an increasing demand for use by contractors developing equipment in their own R&D programs which are not supported by contracts. The Navy Test Facilities, or Laboratories, and their parent technical Bureaus have accommodated requests for use of their facilities subject to the following considerations:

1. Requests for services from non-contractors are accommodated on the basis that the device or equipment can be demonstrated to have an applicability or reasonable potential to Navy programs.

2. Such work when accepted does not enjoy any priority. In this connection, all Navy underwater testing facilities are working on a two or three shift basis to handle the Navy in-house and contractor load as well as the load generated by other government agencies.

**Q. Many contractors feel that the Navy is too close lipped on ASW innovations which make it difficult for other contractors to expand and develop new techniques on new ASW principles. What is your view of this?**

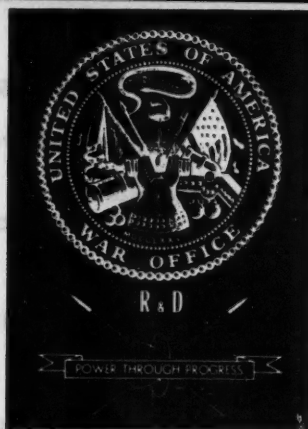
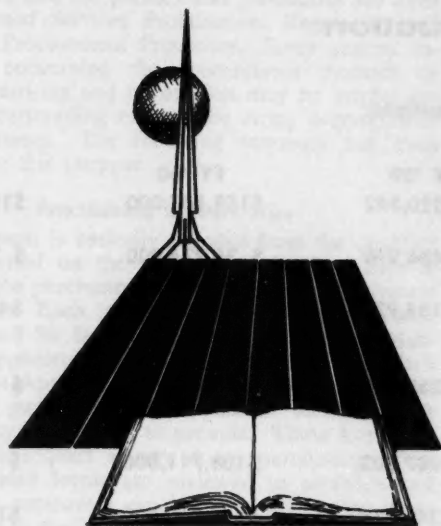
**A.** Well, I think that this situation may have been partially true in the past because of security reasons. However, it must be pointed out that the Office of Naval Research and the Navy Technical Bureaus' have through the years consistently encouraged industry to participate in our research and development programs through the medium of seminars, symposia and direct invitation to participate. A good example of this is the Annual Underwater Acoustics Symposium, in which industry has consistently been invited to participate. On June 15, 1959, in a move to insure that the scientific and technical community of this country is fully aware of the operational and technological capabilities and requirements of the U. S. Navy, the Chief of Naval Operations provided guidance to the Bureaus' and offices of the Department of the Navy as to the manner and methods to be employed in encouraging industry to participate more fully in the Navy long range scientific and technical planning program. This instruction has been widely distributed to industry through the National Security Industrial Association.

**Q. Admiral, what major development would you like to see take place in the ASW field in either detection or kill capability?**

**A.** There is no simple answer to this question. At the moment I believe we have a reasonable capability to detect and kill submarines, our big problem is to discriminate between actual and false targets, therefore the major development required today is the accurate classification of sonar targets. In the future when we have to combat the very high speed deep diving submarine equipped with extremely long range weapons, I am quite sure that our major problem will shift to very long range detection, since without such a capability we will be unable to deliver a kill weapon, nor will we have the opportunity to take evasive action. In reality, the best answer is that we need major improvements in detection, classification, and kill capability to combat the submarines we will have facing us in the near future.



## DATA FEATURE SECTION



## U.S. Army Office of the Chief of Research and Development

### AUTHORITY AND RESPONSIBILITIES OF THE CHIEF OF RESEARCH AND DEVELOPMENT

The Chief of Research and Development, under the functional policy supervision of the Director of Research and Development, and under the direct supervision and control of the Chief of Staff:

**1. Has Army Staff responsibility for:**

a. Planning, coordinating, directing and supervising all Army research, development, testing and evaluation (RDT&E) including all controls over research and development policies, funds, and manpower (within over-all Department of the Army policies) which are essential to the discharge of this responsibility.

b. RDT&E plans and programs.

c. RDT&E projects and tasks and priorities relating thereto.

d. Military characteristics (MC) of new items.

e. Qualitative Materiel Requirements (QMR).

f. Combat and Technical Intelligence relative to research and development.

g. Supervision of the ABC Army and Air Standardization Program, The Tripartite Technical Cooperation Program, the US-Canadian Development Sharing Program, the Mutual Weapons Development Program, the NATO Multilateral Research, Development and Production Programs, research and development functions of the Army Board, NATO Military Agency for Standardization (MAS), and the research and development aspects of other international military cooperation programs.

h. Formulation and supervision of execution of those portions of the annual military budget for the Army which pertain to the RDT&E program, within the over-all budget policies developed by the Comptroller of the Army.

**2. Within over-all Department of the Army policies, directs and controls the RDT&E effort of the technical staffs and services in all matters covered in 1 above, and also—**

a. Assigns RDT&E responsibilities and undertakings.

b. Designates RDT&E objectives.

c. Exercises manpower control over military and civilian personnel spaces of the technical services engaged in RDT&E activities.

d. Determines the distribution and utilization of RDT&E funds.

**3. Within his scope of responsibility, the Chief of Research and Development's relationship to the Chief of Staff and the Army Staff corresponds to that of a Deputy Chief of Staff. In the fulfillment of his responsibilities, he directs and controls the technical staffs and services under a line of responsibility and authority in matters pertaining to RDT&E parallel to the line of responsibility and authority existing from the Deputy Chief of Staff for Logistics to the technical services in matters pertaining to logistics.** ■

# U.S. Army Budget for Research, Development, Test and Evaluation

(Direct Obligations)

	FY '59	FY '60	FY '61
1. Military Sciences .....	\$123,320,342	\$159,107,000	\$151,030,000
2. Aircraft and Related Equipment .....	\$ 54,484,996	\$ 36,274,000	\$ 36,648,000
3. Missiles and Related Equipment .....	\$423,184,926	\$495,507,000	\$494,798,000
4. Ships and Small Craft and Related Equipment .....	\$ 2,355,101	\$ 916,000	\$ 150,000
5. Ordnance, Combat Vehicles and Related Equipment .....	\$118,907,302	\$108,711,000	\$ 88,769,000
6. Other Equipment .....	\$212,244,775	\$204,703,000	\$184,978,000
7. Programwide Management and Support .....	\$ 87,026,790	\$ 96,157,000	\$ 84,127,000

## How to Participate in Army Contracts

### General

The Department of the Army's procurement of supplies and services is accomplished by a number of purchasing organizations stationed throughout the United States and overseas. The immense volume and complexity of the Army's needs dictate this decentralization. This form of organization makes it easier for industry to do business with the Army and insures effective responsibility for the adequacy of the supplies and services which it procures.

This decentralization of procurement is accomplished through the seven Technical Services, the six Continental Army Area Commands, and the overseas commands. For certain general commodity areas, procurement is done through single managership procurement agencies, in accordance with assigned missions for supplies and services related to their specific areas of supply responsibility.

Each Technical Service, to effectively accomplish its procurement requirements, has established one or more principal purchasing offices. These are identified in the Army Procurement Procedure, paragraph 1-251.2. These offices procure assigned production-type supplies and equipment as well as services required for the maintenance or repair of such equipment or supplies. Procurement for research and development may, in some instances, be accomplished by purchasing agencies separately established for this purpose. Normally, this function is performed through general-type procurement offices.

Local purchasing of installation-support supplies and services is accomplished by the individual installa-

tions and activities under the jurisdiction of their appropriate Chiefs of Technical Services or Army Area Commanders.

### Participation in Army Procurement

The above general statement provides a capsule introduction to the Army's organization for procurement. All segments of industry are encouraged to obtain Army procurement business which will utilize their fullest capabilities and potentialities. Each interested firm should make known to those purchasing offices, where such use will be beneficial to both the individual firm and to the Army, its desires and capabilities. Participation by industry in capably serving Army's procurement needs is welcomed and sought. The Army's contracting officers are always available, and maintain an open door to industry's inquiries. Small business advisors assist contracting officers to obtain increased participation by industrial firms in providing the Army's procurement needs. Any firm which indicates an interest in Army procurement, will, if determined to be qualified, be provided full opportunity to share in filling the Army's needs in accordance with its capabilities.

### Army Methods

Each procurement for supplies or services by the Army is accomplished by that method which will be most advantageous to the Government when all such factors as price, quality, delivery, availability, and the like have been considered. Procurements are made on

a competitive basis to the maximum practicable extent in accordance with Chapter 137, Title 10, United States Code, and the policies and procedures set forth in the Armed Services Procurement Regulation and the Army Procurement Procedure. Some general information concerning the procurement methods of formal advertising and negotiation may be helpful for a clear understanding of how the Army accomplishes its procurement. The following summary has been supplied for this purpose.

#### Establishing Bidders Lists

Procurement is basically solicited from the qualified sources carried on the currently maintained lists of bidders of the purchasing office having the procurement requirement. Each company, large or small, must complete and file Standard Form 129 "Bidder's Mailing List Application" and DD Form 558-1 "Bidder's Mailing List Application Supplement" with each office engaged in purchasing the supplies or services which the company is qualified to provide. These forms are available on request at any Army purchasing office. The completed forms are reviewed to establish and identify the company's capability as well as the items for which it is qualified, before the company is placed on the Bidders List. Industry is encouraged to avail itself of this procedure for participation. It is however, prudent to comment on three fundamentals:

- A company should not endeavor to obtain Bidders List status by "broad-side" distribution of sales literature, or by "sales campaign" techniques, or by indiscriminately filing the application forms. A company will attain its most worthwhile expectations by limiting its applications to those purchasing offices that procure the products or services for which the company is qualified and wants to furnish.
- Bidders Lists are periodically purified. A company that has not responded to several consecutive solicitations may be dropped from a Bidders List, unless it notifies the purchasing office that it desires to remain on the Bidders List for future solicitations. When a company, which has been removed from the Bidders List, desires to be reinstated, a new application form should be filed. A new application form should also be filed when a company's line of products or services materially changes.

When a list of bidders contains more sources than are required to insure adequate competition, limited solicitation may be adopted. When this is done, a rotation of the several bidders on the list is followed to assure that each company is afforded equal opportunity under the rotation sequence. By this method, a company will not be solicited to participate in each and every procurement but it will get its fair and equal opportunity to participate in solicitations over a period of time.

#### Other Methods of Participation

Notices of Army procurements, having an expected value of \$10,000 or more, are filed by each purchasing office with the U. S. Department of Commerce, for publication in its daily "Synopsis of U. S. Government Proposed Procurement, Sales and Contract Awards." Subscriptions for this publication are available at \$7

per year. Any company learning through this source, or through any other source, of a proposed procurement in which it has an interest may communicate directly with the responsible purchasing office to obtain a copy of the Invitation for Bids (IFB) or Request for Proposals (RFP) for the purpose of submitting an offer.

#### Submission of Offers

Normally 30 days are allowed, following the date an IFB or RFP is issued, for submission of bids or proposals in order to afford each source sufficient time to make a responsive offer.

#### Evaluation of Offers

The essential differences in the method of evaluating offers in procurement by formal advertising and in procurement by negotiation are:

- *Formally advertised procurement.* All bids submitted within the designated time limit are held unopened by the Contracting Officer until the date and hour stated in the IFB and are then opened at a "public opening," read aloud, and immediately recorded on a summary record. Late bids are not opened and will normally be returned unopened. Following the public opening, changes in bids are not allowed. Decision as to the award is premised on the bid prices and any other responsive stipulations contained in the bid. All bidders are privileged to be present or represented at the public "bid opening."

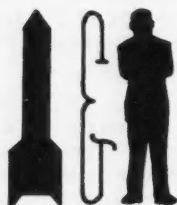
*Negotiated procurement.* Proposals may be submitted to the Contracting Officer up to the designated acceptance time. There is no public opening or disclosure of the contents of such proposals, nor may they be inspected by competing officers. Proposals are immediately recorded on a summary record. Decision as to the award is predicated not only by the prices or stipulations first offered, but by such subsequent negotiations as may be conducted with the officers. Further negotiations are conducted to the extent deemed appropriate by the Contracting Officer in reaching a "meeting of the minds."

The Government retains the right, by either method, to reject any or all bids or proposals, or to reduce the scope of the procurement first contemplated.

Following the bid opening, or the closing date for receipt of proposals, the Government requires a certain period of time, usually not more than 60 days. Under formal advertising, this period is used for evaluation of bids and for pre-award survey of firms making low offers. For negotiated procurement, this time is needed to evaluate each proposal for further negotiation, if indicated, of proposal prices and stipulations, and to accomplish a technical and administrative survey of the companies considered to be within an award range to determine their ability to perform the contract. These actions of the Government, depending on the dollar value or purpose of the procurement, may involve many levels of Army authority and responsibility.

Following the award of a contract, the unsuccessful bidders or officers are notified through a notice placed in the Department of Commerce "Synopsis," as well as other means of the name of the successful bidder or officer, and the gross amount of the awarded contract.





# Missiles and Manpower

A STUDY OF ARMY R&D

To most folks, missiles are truly something special, fascinatingly awesome, the glamour weapon of our times, a new soaring concept in the art of warfare.

To the Army, though, missiles are "just another artillery shell to lob out somewhere."

You have to understand this to get the Army Research & Development operations into proper focus.

Not that the Army and its R&D arm really turns its nose down on missiles. It has, as a matter of fact, some of the best missiles in the business and is constantly seeking better ones. The current workhorse of the Army's missile arsenal REDSTONE is going to give way to the more effective PERSHING and the competent CORPORAL will be replaced by the superior SERGEANT. Under development is a shoulder-fired missile, REDEYE, for the individual soldier to use against attacking aircraft. The Army also is hard at work putting what it hopes may be the finishing touches on one of the nation's most important weapon concepts, the NIKE-ZEUS, designed to knock out enemy ballistic missiles aimed at our homeland.

But, even considering all this, the thinking and the motivation of Army R&D is not really fully understood unless one realizes that the basic philosophy of the Army really hasn't changed . . . i.e., *it is the soldier on the ground who is the key to success in war and still is the most necessary and most fundamental part of the national military posture.*

Now this isn't mere semantics either, or something that might seem like the nice and proper thing to say. It is probably something not fully grasped by industry, but it is a fact, an honest-to-goodness fact, that as far as the Army is concerned everything, missiles, jet planes, all the efforts in space, revolves around the infantry man. He is the center piece in any battle, no matter how fought, the element that must emerge dominantly before there can be any victory.

Therefore, you will find the Army not only interested in that fancy new artillery bit of business, the missile, but in a wide, almost limitless range of things that can better serve and sustain the common ordinary ground soldier.

General Arthur G. Trudeau, head of the Army's R&D efforts, puts it this way: "The scope of our program is as broad as man's imagination, for our primary interest is in man, the soldier."

Fundamentally, this is really no different than when Hannibal and Alexander The Great were around. Instead of elephants helping men to cross the mountains

we now have jeeps and trucks, that's all. But Hannibal understood that it wasn't the elephants that were important but the men with them . . . and that's what the U. S. Army is saying now.

Missiles are wonderful, maybe even more wonderful than elephants, but the Army also would be very much interested in a new pair of shoestrings, if it were superior to current shoestrings and better served the soldier in the field.

At the moment, the Army is quite delighted by progress being made in impregnating soldier clothes. It seems the clothes still remain porous and comfortable, but nevertheless have a raincoat capability in standing up under drizzle and downpours.

Regardless of what kind of plant or business you operate, however big or small, if you have an idea that would benefit the soldier in the field, either in a personal or in a more overall military way, then you have an eager listener in Army R&D.

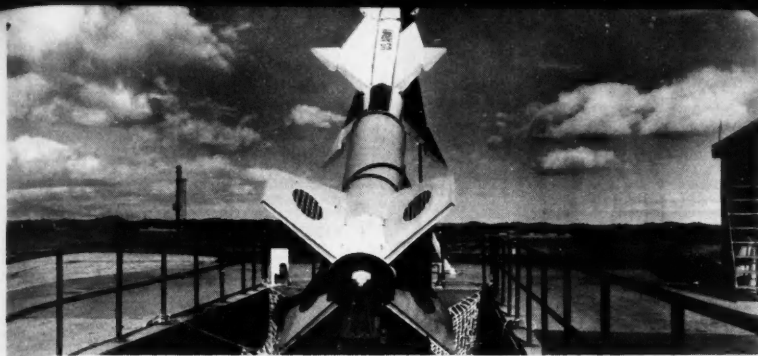
For instance, right now there is interest in such items as this: Ready-to-eat dehydrated ham and cured sausages. Dry whole milk possessing satisfactory flavor under "extingencies of military storage." Pre-cooked eggs which do not require refrigeration. Goggles that will protect men against "flashblindness." An armored vest. Improved insect repellents. A method of determining the deteriorative effects of interactions among food components. An iodine tablet for disinfecting canteen quantities of water with a five-year effectiveness. An armored outfit that will protect men engaged in mine clearance against the hazards of explosions. Gloves that will protect hands in the bitterest of cold weather.

Of course, if you had some worthwhile idea on a new-type missile, Army R&D would be interested in that too. But industry misses a vital point if it doesn't comprehend the broad spectrum with which the Army is concerned. It is safe to say that there is no customer anywhere in the world today that is interested in a greater range of products and objects than the Army's R&D set-up.

There is another dimension to this picture though than just the end results. Lead time—the time from "womb" to "boom"—is a most worrisome thing for the R&D people. The present weapon lead time is considered far too long. It is running from seven to eight years. *Soviets do a comparable job in five years.*

by Harold Helfer/DATA





NIKE-ZEUS.

If the Army should achieve a technological breakthrough today, it would be 1967 or later before any new major weapons system could be put in production. Meanwhile, the communists could steal the information two years after the U. S. had it . . . and still beat America to the punch. This is the real meaning of lead time.

In other words, a breakthrough that Army R&D probably would like to achieve above all other breakthroughs is being able to take better advantage of breakthroughs when they do break through. It has been an agonizing problem and headache but the hard-driving, determined General Trudeau believes it can be whipped.

As he sees it, what is needed is more rapid and intensive exchanges of information between industry and the Army at every stage of development . . . new procedures for expedited development such as overlapping and telescoping phases of the R&D cycle . . . starting production engineering and tooling as early in the development cycle as possible.

These steps are being taken now and Gen. Trudeau feels that the Army is on its way to short-circuiting the Soviets production-wise with a hard-hitting four-year "womb-to-boom" program.

Meanwhile, though, any plant that can convince Army R&D that it has a short-cut in the development of something the Army wants has an inside track in doing business with R&D.

There is still another dimension to the broad general picture that shouldn't be overlooked. While R&D is interested in many immediate down-to-earth matters, such as improving soldier's food in the field, better type tenting, etc., much of the R&D effort is geared toward a world quite a bit beyond the horizon . . . the battlefield of 1975, really.

R&D feels that it already has opened up promising avenues into the future, particularly in metallurgy, electronics, miniturization, fuel cell work and in the nuclear areas. Advances in metallurgy are leading to completely new, unexplored fields of alloys, from which all sorts of vehicles, missiles and electronic devices will benefit. Instead of 7000 parts per cubic foot in transistorized circuits, the Army can now have 700,000 electronic components. The fuel cell, which can operate vehicles by electro-chemistry instead of gasoline motor, doing away with pistons, crankshaft, transmission and the like, already has proven itself in experimental stages and is expected to become operational

before too long.

Considerable progress is being made in developing low-yield, lightweight, nuclear weapons for close support of combat troops. "Tube artillery" isn't being neglected either in research work. It still remains of vital importance for the conventional non-nuclear type war. And there's continual round-the-clock research work on such fundamentals as tanks and rifles. Super giant-type tanks are in the process of being created, while, on the other hand, the efforts in rifle weaponry is to make them lighter and easier to carry but more effective.

All in all, the R&D people feel that in terms of firepower the U. S. Army is truly a formidable organization. In communications, the feeling is, the Army is "ahead." But there is a "crying need," as General Trudeau puts it, for "revolutionary strides" in a third vital field—mobility. He says: "Whether engaged in all-out nuclear war or in a limited brushfire affair, Army combat troops must react faster, cover more ground, protect larger areas and be able to disperse and regroup faster than ever before, in view of the dangers of a nuclear attack."

The general is high on the possibilities of air-cushioned vehicles that will fly a few feet above the earth and permit soldiers to overcome all sorts of terrain obstacles, swamps, mud, ravines, rivers.

But of course whether Army R&D considers itself ahead in one field or holding its own or "making satisfactory progress," it knows that to stand pat in these jet-swift technological times is to fall behind and it is always interested in new thoughts and ideas in any area.

But whether looking at the Army R&D picture from the womb-and-boom viewpoint, the futuristic concepts or the implications of nuclear and missile warfare, no matter how broad and sweeping your vantage point might be, you would overlook and miss the real picture if you failed to make the ordinary down-to-earth soldier the orbit of it all.

General Trudeau makes this as strong as he can: "Man continues to be the most important factor in any combat operation. Man always will play the predominant and final role. No contrivance or concept will substitute for his human powers of imagination, logic and performance in battle in any of the media or dimensions in which he may ever have to operate. It's flesh and blood that has to struggle until a victory is achieved."

# The Army R & D Process

DATA's Chart-of-the-Month on the center spread, and Chart 1 on this page, portray graphically the organizational structure of the Office of the Chief of Research and Development (OCRD). To understand the R&D process it is necessary to look at the organization and functions of OCRD.

The Chief, Lt. General Arthur G. Trudeau, assisted by his deputy, Major General William W. Dick, Jr. and Chief Scientific Advisor, Dr. Harold C. Weber, directs the entire program. Four Directorates assist in the management of the R&D Program.

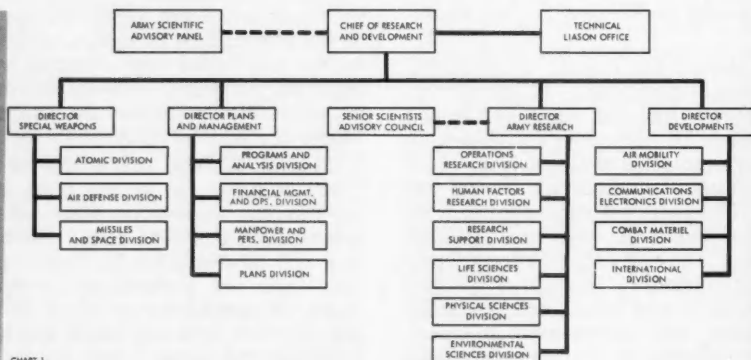
The Chief of R&D receives scientific counsel from the Army Scientific Advisory Panel which meets semi-annually. This panel, which is comprised of apx. fifty of the leading scientists in the U. S., is presently under the chairmanship of Dr. Clifford C. Furnas, President of the University of Buffalo.

The Technical Liaison Office, headed by Col. J. E. Shirley, is responsible for developing and executing information programs for, and maintaining liaison with private and govt. agencies to increase their understanding of Army R&D requirements and objectives. Through this program, the ability of outside agencies to enhance the R&D program is greatly increased.

Brigadier General D. C. Lewis, Director of Special Weapons, supervises that program with the aid of the three divisions of the Special Weapons Directorate. The Atomic Division has general staff supervision for the development portion of the R&D program in atomics to include atomic weapons materiel and nuclear reactors — coordinates requirements with other governmental agencies for development and modification of atomic weapons systems, nuclear reactors and

radiological defense materiel. This division also works closely with other government agencies concerned with atomic research. The Air Defense Division has staff supervision for the development programs pertaining to surface-to-air missiles, conventional anti-aircraft materiel, target drone and fire direction, and control systems utilized by air defense weapons systems. The Missiles and Space Division supervises R&D programs in the field of surface-to-surface guided missiles, space activities, and large caliber free rockets, and also monitors all guided missile supporting research. This division also has staff supervision of the White Sands Missile Range.

Brigadier General G. W. Power, Director of Developments, supervises that program and directs the activities of the four divisions within the Developments Directorate. The Air Mobility Division has staff supervision of the U. S. Army programs concerned with aircraft development, aerial platforms and aerial delivery equipment. The Communications-Electronics Division has staff responsibility for the development of materiel for the Army's combat surveillance, communications, electronics, and target acquisition programs. The Combat Materiel Division has a wide field of responsibilities and interest—has staff responsibility for the development of small arms, mines, conventional artillery, combat vehicles, surface transportation, combat clothing, food, military bridges, and the developments portion of the Army's chemical and biological warfare program; in fact, all other combat and logistical equipment not under the purview of another division. The International Division has general staff supervision of the Army portion of the Mutual Weapons Development Program and supervises U. S. Army par-



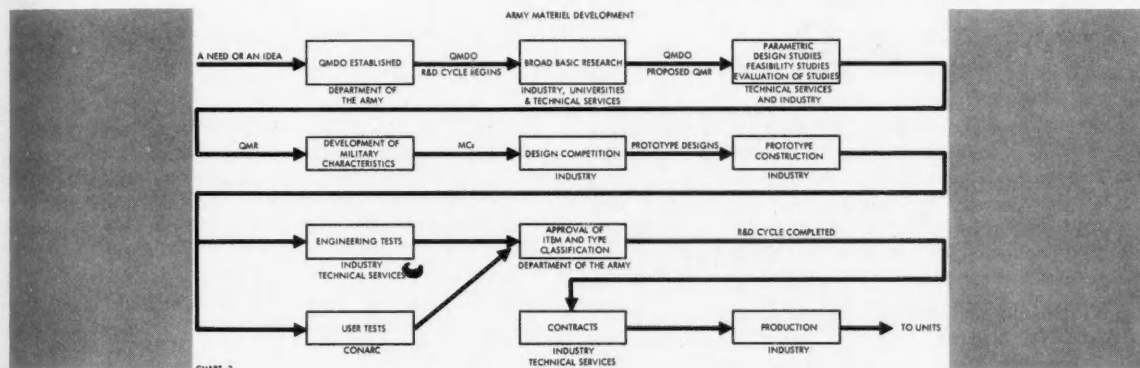
participation in the Tripartite Standardization Program and the NATO Standardization Program.

Brigadier General William J. Ely, Director of Army Research, supervises the Army's efforts in the basic and applied research program and directs the activities of the Army Research Office. The divisions in this directorate include the Operations Research Division, Human Factors Research Division, Research Support Division, Life Sciences Division, Physical Sciences Division and Environmental Sciences Division. These divisions monitor the bulk of the Army research program and are particularly concerned with basic research.

Colonel Roy V. Porter, Director of Plans and Management, has staff responsibility for the overall Research, Development, Test and Evaluation (RDT&E) program to include preparation of annual programs, execution of the RDT&E budget, long-range planning and utilization of R&D manpower. The Plans Division prepares long-range R&D plans and guidance for all elements of the Army. The Programs and Analysis Division supervises the preparation and publication of Army R&D policy and program guidance and coordinates the development of the overall RDT&E program. The Financial Management and Operations Division supervises those areas of the Army RDT&E program which are related to financial planning, budget development and execution, procurement and contracting and facilities. The Manpower and Personnel Division has

Industrial establishments. These ideas are reviewed throughout the Army system and a Qualitative Materiel Development Objective (QMDO) is established where warranted. A QMDO is a Department of the Army approved statement of a military need for development of new materiel, the feasibility of which is not established or not readily apparent. The QMDOs broadly stated establish the goal to which basic research is directed. At this stage, industry, universities, and technical services direct research towards the establishment of a Qualitative Military Requirement (QMR). A QMR is a Department of the Army approved statement of a military need for a new item, system, or assemblage, the feasibility of which is believed probable. The QMR is a long stride towards the end product; however, a QMR will not always be sufficiently definitive to permit the establishment of a development project. The establishment of Military Characteristics (MCs) follows the establishment of the QMR. The purpose of the MCs is to define the capabilities of an item which will enable that item to fulfill a specific QMR. After approved MCs are established, design competition is initiated with industry. After design, selected prototypes are developed and user and engineer tests are conducted concurrently if possible.

Upon the completion of the user and engineering tests, the item is type classified for suitability for Army use. After final approval by the Department of the Army, the item is placed out on contract for pro-



staff responsibility in those areas of Army R&D relating to the planning, development, coordination, execution, and review and analysis of military and civilian manpower management and civilian personnel management policies and programs; staff supervision of the USAR Scientific R&D Unit Program; and development of recommendations concerning enlisted scientific program.

The organization described above has reached its present form through a gradual evolution since January 1955. The internal structure is designed to facilitate the development process of idea to end product throughout the R&D system.

The more significant steps of processes by which new equipment is produced have been shown graphically on chart 2.

Ideas are generated throughout the entire Army and

curement by the technical services. The entire purpose of the cycle is to expeditiously place in the hands of the using troops those items required for the success of the Army's mission.

The time interval from the conception or the initiation of a project until the finished hardware is delivered to the troops is called "lead time". The R&D cycle must be compressed in time, without the loss of an adequate end product, to the point when the present eight year lead time is reduced to a four year period. When this has been accomplished, obsolescence of the end product will be reduced accordingly.

This short article has shown in broad terms the internal structure of the Office of the Chief of Research and Development, the processes required to produce modern equipment for the fighting man, and the requirement to reduce lead time. ■



*Borg-Warner has sold the Army seven of the 5-ton LARCs of the type shown above and another three 15-ton versions of the LARC. This was an R&D project which paid off for the contractor.*

*Currently funded with company money, Chance-Vought hopes to receive contract for continuation of research and development on these articulated flap VTOL/STOL aircraft designed to be Army assault transports.*



## Contracting with Army R & D

If you are a businessman, large or small, who wants to participate in the U. S. Army Research and Development program, this article is addressed to you.

If your company has research and development capabilities which you believe would qualify your organization to participate in the Army R&D program, you should take these steps.

1. Consider whether the proposal is related to the Army's Research and Development activities.
2. Identify which Army Research and Development agency should get the proposal.
3. Prepare and forward the proposal. State what information and materials should be submitted.

### 1. Considering Your Proposal

Army research and development is dedicated to giving your Army today the weapons and facilities it will need to win tomorrow's battles.

New weapons and new techniques change concepts of time and space in warfare. Time is compressed; space is expanded. Future ground combat will involve hard-hitting, fast moving, widely dispersed, self-sustained, integrated combat units operating over battle areas of vastly widened fronts and extended depths. Fire-power, mobility, communications, and staying power are the premium attributes of a strong, modern military posture.

These attributes are derived from new weapons, equipment, and materiel that the accelerating advances of American science and technology make possible. They include a wide range of processes and products that emerge from our research laboratories, our arsenals, and our factories.

The Army's seven Technical Services, in one way or another, have an interest in the nation's space program. There is a growing need to solve Army requirements in this field.

The Office of the Chief of Research and Development has produced a book of guide lines to assist the businessman in his quest of Army R&D contracts. It is called *The U. S. Army Research and Development Contractors Guide*. Copies may be procured from your nearest Ordnance District, The Army Small Business Advisor, Department of the Army, or from the Office of the Chief of Research and Development, Department of the Army, Washington 25, D. C.

A quick reference to the principal interests listed in the introductory pages of the *Contractors Guide* will give you a concrete understanding of the many broad, as well as specific, fields of concern to Army research and development. A glance through its pages will enable you to determine if your proposal comes within the scope of Army research and development programs.

An understanding of the terms research and development, as used by the Army, may help you in that determination:



**Research:** "The theoretical or experimental search for fundamental knowledge and control of a particular substance or physical phenomenon." When this search is conducted without any specific goal of applying the results to a particular problem at hand, it is "basic" research. When it is concerned with a particular problem, it is "applied" research. While the Army does support some basic research, its greatest financial outlay is in the area of applied research.

**Development:** "The practical application of investigative findings and theories of a scientific and technical nature." This includes the construction and testing of prototype models and devices.

It is well to state here what clearly does not go to Army Research and Development.

#### **Procurement of Standard Products**

Purchasing or procurement of standard products or components is not within the scope of Army Research and Development activities.

For such information write to:

The Army Procurement Information Center  
Old Post Office Building  
12th Street and Pennsylvania Avenue  
Washington 25, D. C.

Ideas of inventions, contrasted with research and development, which might have military usefulness, should not be sent to Army Research and Development.

Send them to:

The National Inventors Council  
Department of Commerce  
Washington 25, D. C.

The National Inventors Council is composed of qualified scientists and engineers who evaluate each suggestion or invention received. If after considering the suggestion or invention in the light of technical feasibility, existing developments, and military requirements, these experts feel it should be brought to the attention of Army Research and Development, they send it to the proper agency for further investigation.

If you have now determined that your proposal should go to Army Research and Development, you will want to know which agency (or sub-agency) is directly concerned with what you have to offer. The *Contractors Guide* will help you make that decision.

#### **2. Identifying the Proper Source of Communication**

Your *Contractors Guide* lists items and activities with which each of the seven Technical Services of the Army is concerned. Under each Technical Service are given the names of the central agency and sub-agencies (if any) which make contracts for research and development work of that Technical Service, and those matters handled by each.

Obviously it would be impractical to list all details in the *Contractors Guide*, but the lists contained give the businessman sound direction.

In case you are concerned with some basic research or special activity not included in any of the lists,

read the section on Special Activities. If you end up still uncertain about the proper place to go with your proposal, write to the Office of the Chief of Research and Development—you'll get a prompt reply.

Office of Chief Research and Development  
Department of the Army  
Washington 25, D. C.

ATTN: Technical Liaison Office

#### **3. Preparing and Forwarding Your Proposal**

You will have time in getting action on your proposal if you make it thoroughly clear and complete. As far as feasible, therefore, include all the following information in your first letter:

##### **a. Organization information**

1. Name and type of company.
2. Total number of employees; also totals of research scientists, development engineers, or other technical personnel.
3. Facilities—brief description of laboratory equipment and other facilities suitable for research or development activity.
4. Clearance—if you have had "facility clearance" from Army, Navy, or Air Force, state which.
5. Background—brief outline of work done previously in field of your proposal.
6. Descriptive brochure and financial statement if available.

##### **b. Clear and full discussion of proposed work in terms of objectives and scope.**

Should you have no specific project to propose, but merely want to list your company as a possible candidate for future work that may develop in your field, an expression of this desire along with the organizational information outlined above would be welcomed by the appropriate Technical Service. If possible, call on the procurement offices near you, or write to them telling of your capabilities and of your desires.

Most Army Research and Development contracts result from negotiations rather than from advertising and bids. Most contractors are selected on the basis of experience, adequacy of facilities, skill and availability of personnel, quality of workmanship, plant organization, etc., as well as price. The award of a contract is generally by administrative decision based on considered judgment.

If your proposal is accepted, a contract may be negotiated between your organization and the appropriate Technical Service agency, or sub-agency. Details regarding the type of contract, calculation of overhead or indirect costs, capital equipment to be furnished by the Army, special stipulations pertaining to contract termination, labor regulations, patent rights, etc., will be discussed and worked out between you and the agency concerned.

If your proposal is not accepted the Government is, of course, not obligated in any way to reimburse you for any costs which you may incur in submitting a proposal or attempting to arrange a contract. ■

# DATAGRAF CHART-OF-THE-MONTH

## DEPARTMENT OFFICE OF THE CHIEF OF Washington

### OCRD LEGEND

This Chart shows room and phone numbers, respectively, for personnel assigned to Office of the Chief of Research and Development. Most offices shown are in the Pentagon. Dial OX and then extension when calling from outside.

### ADMINISTRATIVE OFFICE

CWO A M Dawson, Actg Ch 3D 442 75514  
Management and Civilian Personnel Branch  
Mrs N L Conner, Ch 3E 411 52018  
Military Personnel Branch  
Mrs C R Durkin, Ch 3E 411 52173  
Administration Service Branch  
CWO A M Dawson, Ch 3D 442 75514  
Mr W A Anderson, Records Mgt 3D 442 75514  
Mr L L Witche, Mail & Records 3D 442 75525  
Miss E Sisk, Security and Special Files 3D 436 75425

### Director/Special Weapons

\*Brig Gen David C Lewis 3E 428 52362  
Col Charles G Patterson 3E 428 52362  
Col Walter T Kernen Jr Deputy 3E 428 72449  
\*Assigned not joined

### ATOMIC DIVISION

Lt Col E P Yates, Ch 3E 365 79046  
Lt Col J D Service, Asst Ch 3E 365 79046  
Nuclear Weapons Branch  
Lt Col R H Scheier, Ch 3E 365 74666  
Maj F E Shelton 3E 365 74666  
Maj J S Oppenheimer 3E 365 74666  
Nuclear Energy and Effects Branch  
Lt Col R L Comery, Ch 3E 365 73484  
Maj J P Tyler, III 3E 365 73484

### AIR DEFENSE DIVISION

Col T H Barfield, Ch 3E 373 54552  
Lt Col J K Taylor, Asst Ch 3E 373 54552  
Advanced Air Defense Systems Branch  
Lt Col J G Healy, Ch 3E 383 52778  
Lt Col E L Smith 3E 383 52778  
Maj C J LeVan 3E 383 52778  
Maj R W Fye 3E 383 52778  
Air Defense Systems Branch  
Lt Col M C Johnson, Ch 3E 385 70772  
Lt Col A F Hansen 3E 385 70735  
Lt Col M Jgermeister 3E 385 70772  
Lt Col G B Brown, Jr 3E 385 70735  
Support Branch  
Maj R L Baker, Jr, Ch 3E 379 79437  
Maj J D Ingman 3E 379 79437  
Maj R S Daniels, Jr 3E 379 79437  
\*Assigned Not Joined

### MISSILES AND SPACE DIVISION

Col T A Rodgers, Chief and Exec Secy, ABMC 3E 429 53739  
Lt Col J A Ogilvie, Asst Ch 3E 429 53400  
Ballistic Missiles Branch  
Lt Col R M Pearce, Ch 3E 425 52868  
Maj S R Baun 3E 425 52868  
Space Branch  
Lt Col D E Simon, Ch 3E 425 71714  
Maj L Mittenhal 3E 425 71714  
Maj F W Powers 3E 425 71714  
Tactical Missiles Branch  
Lt Col D Deeman, Jr, Ch 3E 437 71562  
Maj B B Schmidt 3E 437 75571  
Maj D M Copp 3E 437 71562  
Capt J M Kiernan, Jr 3E 437 75571  
\*Assigned Not Joined

### SENIOR SCIENTISTS ADVISORY COUNCIL

Dr G H Lee OCSd 2E 350 73345  
Dr C M Crenshaw OCSd 2E 286 79681  
Dr R G H Su OCSd T-6 74062  
Dr P R Frolich OCSd T-7 53529  
Dr J B Youmans OTSG McHenry 56738  
Dr G G Quarles OCE T-7 74630  
Mr R C Kerr OCT T-7 55238

### ARMY RESEARCH OFFICE

Director/Army Research  
Brig Gen William J Ely 3E 374 73710  
Col R A Weiss, Dep and Scientific Director, Rm 2040 Code 189 521  
Col R E Kunkel, Asst Dir Rm 2042 Code 189 2563  
Lt Col J F Schremp, Exec Rm 2042 Code 189 2564  
Lt Col H Curtis, Asst Exec 3E 374 77942  
ARO Liaison Office 3E 389 56608  
Mr H F Weiler, Spec Asst to Scientific Director Rm 2040 Code 189 521  
Scientific Advisor  
Dr P A Siple Rm 2046 Code 189 2156

### ADMINISTRATIVE OFFICE

CWO W J McNally, Jr, Ch Rm 2400 Code 189 2555

### OPERATIONS RESEARCH DIVISION

Col C B Hazlett, Jr, Ch Rm 2047 Code 189 2562  
Lt Col N L Hall Rm 2047 Code 189 2562  
Evaluation Branch  
Lt Col O K Henderson, Ch Rm 2049 Code 189 2561  
Maj B D Spalding, Jr Rm 2049 Code 189 2557

### ORO R&D LIAISON OFFICE (R046)

6955 Arlington Road  
Bethesda, MD  
Col V M Schultz, Sr Mgt Adv OLiver 4-4200 40  
Col J M Duncan, Dep Mgt Adv OLiver 4-4200 27  
Lt Col L S Stoenbach OLiver 4-4200 506  
Lt Col M W Pettit OLiver 4-4200 276  
Lt Col G E Roberts OLiver 4-4200 417  
Lt Col K Wombold OLiver 4-4200 394  
Lt Col P Aulrey OLiver 4-4200 408  
Maj C J Ippolito OLiver 4-4200 44  
Maj B R Gorenz OLiver 4-4200 58  
Maj G A Hahns OLiver 4-4200 244  
Maj C C Jacobson, Jr OLiver 4-4200 520

### HUMAN FACTORS RESEARCH DIVISION

Lt Col G J Bayless, Jr Ch Rm 2403 Code 189 2441  
Dr L E Baker Scientific Advisor Rm 2401 Code 189 2441  
Training Research Branch  
Lt Col J L Gurney, Ch Rm 2403 Code 189 2443  
Maj T H Teckleberry Rm 2403 Code 189 2442  
Individual Research Branch  
Lt Col E W Hall, Ch Rm 2403 Code 189 2443

### RESEARCH SUPPORT DIVISION

Col R W Stader, Ch Rm 2406 Code 189 533  
Mr H F Weiler, Asst Ch Rm 2040 Code 189 521  
Scientific Information Branch  
Mr C E McCabe, Ch Rm 2410 Code 189 2453  
Maj C E Ramberg Rm 2410 Code 189 2451  
Mr P C Daniels Rm 2412 Code 189 2451  
Mr C T Smith Rm 2412 Code 189 2452  
Scientific Manpower Branch  
Mr R L Schwartz, Ch Rm 2402 Code 189 2446  
Lt Col T J Hubert Rm 2404 Code 189 2448  
Mr J V Brian Rm 2404 Code 189 2447  
\*Lt Col C J Melley, Jr Rm 2408 Code 189 2445  
Foreign Research Branch  
Lt Col F L Schaf, Jr, Ch Rm 2408 Code 189 2445  
Maj W G Langley Rm 2408 Code 189 2445  
Contractual Procedures Branch  
Mr H E Friend, Ch Rm 2408 Code 189 2444  
CWO Task Group  
(729-22nd St, N.W., Washington, D.C.)  
Col (Ret) H P Hennessy FE 7-1504  
\*Assigned Not Joined

### ENVIRONMENTAL SCIENCES DIVISION

Dr L S Wilson, Ch Rm 2409 Code 189 2508  
Geophysics Branch  
Dr H Lamont, Ch Rm 2407 Code 189 2551  
Dr L S Trumblood Rm 2405 Code 189 2560  
Mrs F L Wenden Rm 2407 Code 189 2552  
Maj N R Rosen Rm 2405 Code 189 2560  
Capt D A Beckner Rm 2405 Code 189 2552  
Polar Branch  
Dr C R Eklund, Ch Rm 2413 Code 189 2553  
Maj J R Young Rm 2413 Code 189 2554  
Dr P P dePerin Rm 2413 Code 189 2553

### LIFE SCIENCES DIVISION

Col R H Oliver, Ch Rm 2424 Code 189 2527  
Biophysics-Biochemistry Branch  
Lt Col F J Haase, Actg Ch Rm 2420 Code 189 522  
Lt Col P G Olmstead Rm 2418 Code 189 527  
Dr L M Ames Rm 2418 Code 189 532  
Dr F W Northland Rm 2418 Code 189 522  
Medical and Biological Sciences Branch  
Lt Col J B Hantgering, Ch Rm 2422 Code 189 2566  
Maj S D Fair Rm 2422 Code 189 2594  
Capt H H Pattillo Rm 2422 Code 189 2594

# MENT OF THE ARMY OF RESEARCH AND DEVELOPMENT Washington, D.C.

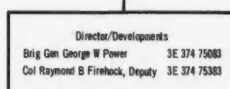
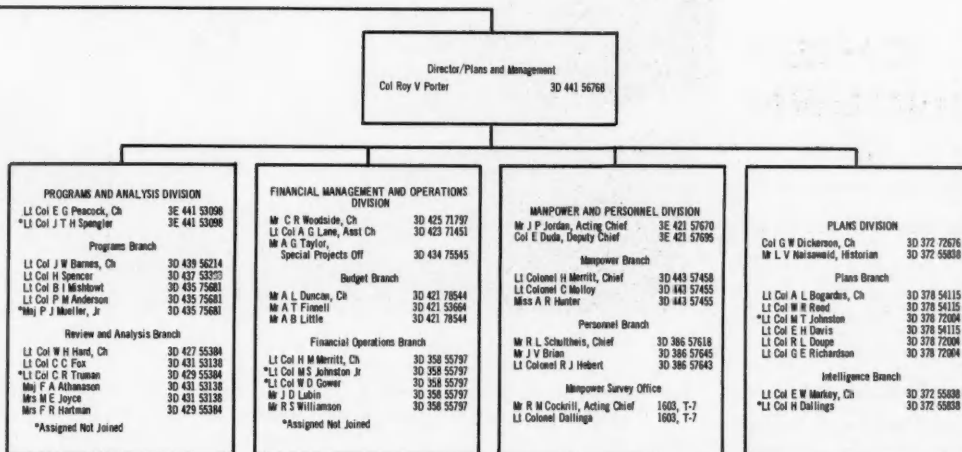


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October • 1960

Chief of Research and Development	3E 412 78186
Arthur G. Truitt	
Deputy Chief of Research and Development	
William W. Dick, Jr.	3E 412 78187
Special Assistant	
Mrs M. Tamm, Jr.	3E 415 75435
Chief Scientific Advisor	
Ed C. Weber	3E 428 72512
Executive	
Mr K. Bales, Jr.	3E 412 54997
and P. Carlson	3E 412 54997
Asst. Executive for Admin.	
W. Green	3E 411 54513
Secretary-Administrative Advisory Panel	
Paul D. McGowan	3E 421 77877
Lyndon B. Wilson	3E 421 78709

TECHNICAL LIAISON OFFICE	
Col J. E. Shirley, Ch.	3D 384 55949
Lt Col R. W. Ernst, Asst. Ch.	3D 384 72830
Editorial and Liaison Branch	
Lt Col K. C. Emerson, Ch.	3D 377 73715
Lt Col F. A. Smith, Jr., Special Projects Officer	3D 377 56496
Maj L. G. Hergert, Jr.	3D 377 55744
Mr J. K. Koepf	3D 377 56471
Mr W. J. Webb	3D 377 56471
Pictorial Branch	
Mr L. Lieb, Ch.	3D 371 52878
Mr E. J. Morrissey	3D 371 52878
Research Media Branch	
Mr W. Willis	3D 386 74615
Consultant	
Mr John E. Horton	



PHYSICAL SCIENCES DIVISION	
Dr R. Anderson, Jr., Ch.	Rm 2421 Code 189 2324
Lt Col L. V. Anderson	
Mathematics Branch	
Mr F. Friedman, Ch.	Rm 2415 Code 189 2558
Mr G. W. McCong	Rm 2415 Code 189 2583
Physics and Engineering Branch	
Mr R. B. Watson, Ch.	Rm 2423 Code 189 2531
Mr R. B. Watson, Jr.	Rm 2423 Code 189 2533
Mr R. B. Watson, Jr.	Rm 2423 Code 189 2532
Mr R. B. Watson, Jr.	Rm 2423 Code 189 2532
Mr R. B. Watson, Jr.	Rm 2423 Code 189 2534
Chemistry and Materials Branch	
Mr R. B. Watson, Ch.	Rm 2417 Code 189 526
Mr R. B. Watson, Jr.	Rm 2417 Code 189 522
Mr R. B. Watson, Jr.	Rm 2417 Code 189 525
Mr R. B. Watson, Jr.	Rm 2417 Code 189 520
Mr R. B. Watson, Jr.	Rm 2417 Code 189 525
*Assigned Not Joined	

AIR MOBILITY DIVISION	
Col R. R. Williams, Ch.	3D 361 53869
Lt Col A. J. Rankin, Asst. Ch.	3D 361 74509
Plans and Requirements Branch	
Lt Col A. J. Rankin, Ch.	3D 361 74509
Lt Col J. T. Todd, III	3D 361 74509
Maj J. A. Pelt	3D 361 75590
Army Aircraft R&D Branch	
Lt Col H. L. Bush, Ch.	3D 365 72738
Lt Col T. E. Haynes	3D 365 54836
Maj P. E. Kilpatrick	3D 365 54836
Support Aircraft-Aerial Delivery Branch	
Lt Col E. L. Mueller, Ch.	3D 365 54836
Consultant	
Mr Eugene L. Vidal, Army Aviation	

COMMUNICATIONS-ELECTRONICS DIVISION	
Col W. Scandrett, Ch.	3D 364 77732
Col F. F. Quist, Asst. Ch.	3D 364 77732
Communications/Avionics Branch	
Lt Col L. B. Brownfield, Ch.	3D 364 77816
Maj G. O. Addison, Jr.	3D 364 77816
Combat Surveillance Electronic Warfare Branch	
Lt Col D. P. McLaughlin, Ch.	3D 364 75667
Maj H. C. Smythe, Jr.	3D 364 75667
*TDY C&GSC, Ft. Leavenworth, Kans.	

COMBAT MATERIEL DIVISION	
Col A. D. Harse, Ch.	3D 418 54585
Lt Col L. R. Patrick, Asst. Ch.	3D 418 55389
Combat Arms Branch	
Lt Col B. O. Norman, Ch.	3D 426 74319
Lt Col F. S. Conally, Jr.	3D 426 72119
Lt Col O. Samuel, Jr.	3D 426 72119
Lt Col R. C. Peoples, Jr.	3D 426 56091
Maj R. E. Hays	3D 426 56049
Maj W. H. Young	3D 426 56049
Maj W. H. Clark	3D 426 56091
General Materiel Branch	
Lt Col W. L. Miller, Jr., Ch.	3D 430 75670
Lt Col J. G. Rowlings	3D 430 53859
Lt Col R. B. Bennett	3D 430 71736
*Lt Col T. C. Oliver	3D 430 75670
*Assigned Not Joined	

INTERNATIONAL DIVISION	
Lt Col T. C. Ream, Ch.	3E 438 55739
Lt Col T. E. Watson, Jr., Asst. Ch.	3E 438 55739
Foreign Developments Branch	
Lt Col W. A. Gaultney, Ch.	3E 441 72590
Lt Col J. O. Dutton	3E 441 72590
Standardization Branch	
Lt Col T. C. Ream, Ch.	3E 438 77879
Mr D. R. Grande, Jr.	3E 438 77879
Liaison Officers	
Col J. D. Shrock (British)	3E 443 72809
Lt Col B. W. Miller (Canadian)	3E 443 72804



## CHIEF CONCERN

An exclusive interview with  
Lt. Gen. Arthur G. Trudeau

by Harold Helfer/DATA



### COST PLUS CONTRACTS

In an exclusive interview with DATA, Lt. Gen. Arthur G. Trudeau, Chief of Army R&D, revealed he was concerned about the cost-plus contracts.

He said that it appeared that there was a tendency in industry, under this type contract, knowing that its cost factor is guaranteed, to be lackadaisical about expenses and efficiency of operation.

Furthermore, the hard-hitting general said he intended to do something about it.

### LOSING CONTRACTS

Where it seemed apparent that a company had been lax and indifferent about operational costs, Army R&D is going to have "second thoughts" about giving this concern any other contracts.

It could mean the difference whether a firm was given another contract or not, the general clearly indicated.

General Trudeau also expressed concern in these other areas where industry was involved:

### WHY WE FALL BEHIND

1. He felt there was too much complacency in general in industry, particularly in the matter of this country's general posture in the world at large, that there wasn't sufficient realization that we were dependent on trade with the rest of the world for certain necessary material. Furthermore, as the result of this smugness, we were falling behind competitively in world trade. If, for instance, Germany wasn't still so involved building up its own industry, she probably would be showing this nation a thing or two in the international trade mart.

2. There isn't enough push and drive and initiative in the research field.

3. Industry needs to retool and modernize itself more. The threadbareness is beginning to show through. Unless an effort is made

to correct this, there will be more and more plants who will find themselves hard put to handle contracts for the Army whose technological tolerance factor is continually narrowing and fine precision components more and more a necessity.

### MOST NEEDED ITEM

What breakthrough contribution would the general most like to see industry come through with at this time?

He didn't hesitate to answer this one. "A silent power plant," he said. The Army, he let it be known, has need for it in almost all its vehicles, tanks, trucks, jeeps, even planes.

Says the general: "In the last 100 years, 2% of recorded time, mankind has achieved 90% of all its technological progress since the beginning of time. And the future is even more challenging."

And it is quite plain that as far as he is concerned anyway Army R&D is going to find it that way. ■



## Profiles of Leading Personnel in OCRD



LIEUTENANT GENERAL ARTHUR G. TRUDEAU  
Chief of R&D, Army



MAJOR GENERAL WILLIAM W. DICK, JR.  
Deputy Chief of R&D

**FEW PEOPLE HAVE** stepped into a tougher Army spot than General Trudeau. General James Gavin had pulled out as the head of R&D in sharp protest against what he felt was a lack of proper overall attention and emphasis on research and its ramifications.

But if anyone could grab the reins and keep things going without too much of a loss in stride or face, it was this sharp-minded, intense Army officer. And the impression around the Pentagon is that, while getting sufficient corral space (trans., funding, cash, moola, where-withal), is still a problem and makes for some limitations and inhibitions, he has things hopping pretty good in R&D.

This is not the first time General Trudeau has been called into an emergency-type breach. Eisenhower "borrowed" him to break Normandy beach invasion bottlenecks during World War II and at the request of Gen. MacArthur he was sent to the Pacific to assist in the planning of amphibious operations there. He was one of the heroes of the famed Pork Chop Hill action during the Korean war, inspiring his troops by exposing himself to enemy fire as he led them into action.

A native of Middlebury, Vt., of French Canadian ancestry, the tough-minded, hard-driving top Army R&D man is one of the most remarkable individuals in the military establishment not only of this era but almost of any generation.

It isn't only that he does things with such single-mindedness, and is so quick to come to the core of the problem, but there is his amazing versatility to go along with it.

At West Point, he graduated near the top of his class. He sang in the Catholic choir but he was quite an athlete too. In fact, he was the mainstay of his track team. He was a crack shot, and in an amazing kind of fashion. He was literally a two-gun man . . . shooting equally well with either hand.

He was a special assistant to General Hugh Johnson on the New Deal WPA operation. After World War II, he served on the commission that tried the Japanese war criminals.

The father of two children, a boy and a girl, he is also an author. He wrote a military-political book entitled "Some Military Aspects Of American Statescraft."

There just doesn't seem to be any limit to the man's talents. He's a better than average golfer.

If there are still some doubting Thomases about this man's many-sidedness, get this: He can play the banjo left-handed!

General Trudeau is the dynamic, tough-minded, irrepressible, bantam-rooster type guy that James Cagney used to do so well on the screen. And maybe Cagney will do Trudeau yet.

**GENERAL DICK** once gave Heinz some competition. He didn't exactly have 57 varieties, but he did have 27. He grew 27 different kinds of vegetables in his home garden while stationed in Indiana. In Washington, he doesn't have the time . . . or the right kind of soil, for that matter . . . but he still grows his own corn and tomatoes.

The lean, wiry general always has had a good-size streak of ingenuity in him. Out in the South Pacific, during World War II, fed up with canned spam, he began feasting on tuna. How? Very simple. He'd just go deep-sea fishing.

The general would like to extend this ingenuity to include stretching the R&D dollar. He told *Data* that he felt perhaps the time had come to shift some of the emphasis from urgency to efficiency, to be more conscious of the economics involved.

It is clear he thinks that industry should become increasingly more concerned with the efficiency of operation. He says industry has done a great job technologically, but it is imperative that it make a concerted effort to get the cost of projects down.

He doesn't think unlimited and uninhibited bidding is the answer, not, anyway, in the research field, where know-how and a recognizable potential is essential if there is to be any real promise of success.

In his quiet, serious way, General Dick

hopes to impress on industry the need for greater efficiency and less costly operation. This, at the moment, is what concerns him particularly.

To keep fit, General Dick, who is originally from Alabama and has two sons who are young artillery officers, divides his time between swimming and bowling. And though his work schedule is too demanding these days to do much about turning it into reality, he does sometimes relax for a moment by day-dreaming he's out somewhere hauling in some big game fish from the briny deep.



**BRIG. GENERAL WILLIAM J. ELY**  
Director of Research

**GENERAL ELY** (pronounced Eee-lee) is a bespectacled, rather slender man but if you find yourself aligned against him on the golf course, take care. Ignoring the *avoidupois* factor, he has developed a mighty potent swing anyway. The general is one of the Pentagon's better golfers, shooting regularly in the 70's.

General Ely and his wife Helen are both ardent golfers. They also are avid bridge players. And something else the general in particular is quite rabid about is the Pittsburgh Pirates, his hometown being nearby Claysville, Pa., where his father is a farmer.

But while the sports-minded general can discuss the Pittsburgh baseball team with considerable fondness and in great detail, he always does so with something of a sigh in his voice.

The reason: Such is the vagaries of Army life that the general, for all his devotion to the Pirates, has never been able to see them play.

Next to doing a proper job of coordinating the various research projects of the Army, this probably is his greatest ambition.

The general whose middle name is, of

all things, Jonas, has three sons, Bill, Jr., a West Point cadet, and Richard and Robert, who are in high school.

General Ely is regarded as a particularly smooth executive-type officer and is considered, in particular, to be one of the Army's top construction and real estate experts. The scientific part of his background stems not only from his Army Academy classrooms but from an advanced civil engineering course he took at Cornell University.

The general keeps up with the latest scientific trends by reading a considerable number of technical publications. But among these journals you also are likely to find a *Sports Illustrated* or a *Sports Magazine* or something like that. When the burdens of his job keeps him chair-bound, the general sometimes relaxes for a moment vicariously by scanning a sports item here and there.



**GEORGE WILSON POWER** is one of the GI-est looking of all the Pentagon generals, the kind of soldierly officer that John Wayne is always playing on the screen.

The tall, lean officer with the sharp, immaculate crewcut is also just about the "askingest" general around the Pentagon. It's his way of getting the facts, ma'am, just the facts. He can ask two or three dozen questions in 10 or 15 min-



**BRIG. GENERAL GEORGE WILSON POWER**  
Director of Developments

utes but he'll "worry" away at something that is bothering him until he feels that he has the matter in his grasp and can make a proper decision on something.

He says this is the No. 1 challenge of his job, to make sure that he has enough facts for the correct decisions on the great variety of matters which he must decide, matters ranging from super tanks to light pistols . . . and, at the same time, to try to eschew the facts that are extraneous and just cluttering

up his thinking. Which facts are which is a decision in itself.

Gen. Power not only looks like the popular concept of a general but the romance in his life was something that Hollywood would appreciate. He met his wife-to-be, Carol Dean Palmer, while he was on duty in exotic Panama. Carol is the daughter of an Army officer, a man with a name that seems like something strictly out of a Richard Harding Davis adventure story . . . Col. Resolve Potter Palmer.

Gen. Power shoots golf in the 80's, likes to indulge in gardening, mainly flowers, but doesn't feel right, as an Iowan, if he doesn't have at least a little patch of land wherever he lives devoted to corn. He says, "Vegetables from your own garden always taste better."

The general also goes in for woodshop work around his home, does a good bit of his furniture repairing, has promised himself that when he retires and his military roaming days are over he's going to equip himself with some real sure-enough power machinery.

The general, whose dad was superintendent of Fairfield, Iowa, schools, has held down some of the Army's top assignments. He was commander of the First Guided Missile Brigade and was in charge of the Army's Air Defense set-up while at Fort Bliss.

The Powers have two daughters, Carol, who recently got married, and Kathryn, who goes to high school. The general is partial to sea food when he's eating out, can cook a pretty mean steak on his backyard grill but says the kitchen is his wife's "bailiwick" and he abides by all her culinary decisions—no questions asked.



**IT WAS NOT** so long ago, that you might have found General David Lewis working in his Pentagon office with his blouse and tie removed, and

**BRIG. GENERAL DAVID C. LEWIS**  
Director of Special Weapons





shirt open wide at the collar. Actually, the fact that the General was at the Pentagon at all is a credit to his stamina.

The fact of the matter is that what happened is Gen. Lewis, coming to Washington from a post in Germany to take over his Special Weapons assignment, bought himself a home in the Washington area and promptly set out to investigate and do a little clearing work in a patch of woods on the property.

Little did the general realize until the next day that he had encountered a mess of poison ivy, resulting in a far from comfortable chest rash. It is really a triumph of mind over matter . . . he being mindful of the matter that everything at Army R&D is always going full steam ahead.

Gen. Lewis has moved around so much in the Army that he isn't quite sure just what to list as his official residence any more. He was born in Wilkes-Barre, married a Westchester girl, Marie Tapper, but has spent quite a bit of his time in Philadelphia. "I suppose I'm from at least one of those three places," he proclaims good-naturedly.

The not-to-tall but well-constructed officer is a valuable Army element these days in that he is both an excellent line man as well as having a broad understanding of the technological military area and its problems. He was artillery commander of the 3rd infantry division in Germany before coming to the Pentagon this past July to take over his important R&D post. To further show his versatility, he also has served as a chief information officer in his Army career. You can therefore expect him to be conscious of the public relations aspects of R&D. This is not his first post with R&D. A few years back he was chief of the surface missiles division in R&D.

As current director of Special Weapons for R&D, missiles again come under his wing but he is by no means chauvinistic about them. He is willing to concede that the Army must endeavor to stay on top of the whole spectrum of weaponry, rifles, carbines, pistols, etc.

Gen. Lewis has four children, two boys, David and Steve, who are engineering students at Penn State, and two girls, Marianne, who is attending high school in Virginia and Deborah, a 10-year-old grammar school student.

When he can get away from things, the general likes to do a little fishing and hunting and once in awhile will get out on the tennis courts. He is a great one for reading "professional Army books," is always trying to induce others around him to do likewise. But the general admits he has one weakness. It's mystery books. When he curls up in bed at night with a book, it's not likely to

be something by MacArthur or Eisenhower but by Agatha Christie or Earle Stanley Gardner.



**DR. HAROLD C. WEBER**  
Chief Scientific Advisor to the Chief of R&D

**DR. WEBER** (pronounced Wee-ber) is a soft-spoken, scholarly man who makes himself equally at home behind some learned technological book or in a machine shop.

He is a dreamer who believes in producing.

The author of one of the definitive books in the chemical field, *Thermodynamics For Chemical Engineers*, he also holds patents in petroleum processing, textile chemical processes and electronics.

He can spend the day listening to theories that could revolutionize space missile propulsion, then, that evening, go down to his basement machine shop at home and spend hours turning out one simple but, you can bet, very precise screw.

He loves to listen to dreamy semi-classical music. But the graceful sounds come from a hi-fidelity system that he spent many hours making himself.

Dr. Weber, who won the Army's Meritorious Civilian Service Award and is recognized as one of the top men in the chemical engineering field, told *Data* that he thinks the next big breakthrough in science may be in a speed up of the processes in chemistry, with a tendency toward smaller equipment. He sees this as not only a great advantage to the military establishment, both time-wise and economically-speaking, but something that would have a big impact on the civilian world, cutting down the costs on a great many items, ranging from the cost of frozen food to dacron suits and nylon hose.

Dr. Weber can work up considerable enthusiasm when he gets on subjects like this that are close to his heart, but he's a good listener too. Anyone with an idea can approach him knowing that he will receive considerate attention.

A Bostonian, Dr. Weber studied at both M. I. T. and in Switzerland and he taught chemical engineering at M. I. T. He's been with the Army Scientific Advisory Panel for six years and the Chief Scientific Advisor for two.

A widower, without children, he leads a quiet, simple life. He used to go in for tennis but he divides nearly all his spare time now between reading technical journals and fooling around with his "home-made" machine shop.



**WHEN RICHARD ALEXANDER WEISS** was a boy in Highlands, N. J., his dad would take him over to nearby Fort Monmouth, the Army Signal Corps' big base of operations and proudly show him the various functions.



**DR. RICHARD A. WEISS**  
Deputy and Scientific Director, Army Research

The elder Weiss, who worked at the base, would say to him, "Take a good look . . . someday you may be working here. They've got a lot of nice jobs around here."

Little did Mr. Weiss dream that his boy would some day grow up to not only have a voice in matters effecting Fort Monmouth as well as many other functions of the Army.

A sturdy-looking, well-knit individual, Dr. Weiss attended both Randolph Macon College and the University of Virginia. He was a rate analyst with American Telephone Co. for awhile, did research in foundry processes for Magnolia Metal Co. and served as a scientific advisor in the historic nuclear explosions at Bikini in the Pacific.

Perhaps it isn't too well understood, but his job is not only to plan, co-

ordinate and supervise the Army's research program, which makes him a key scientific advisor of R&D, but he also maintains liaison on the highest level with scientific staffs in the other services, governmental agencies, industry, research foundations and universities. And it is obvious that he is acutely concerned with the public image that Army research is creating.

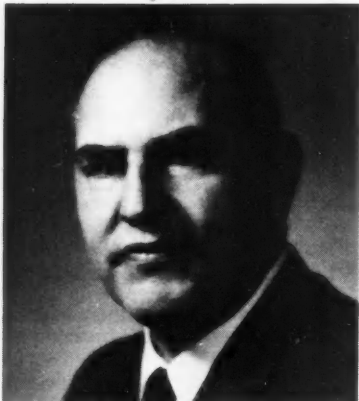
All of which makes Dick quite a busy fellow but he still finds time to get in some golf and fishing. He likes to read at home too, but, "as a change of pace," goes in for literature dealing with the social sciences rather than his own field. When he travels though . . . and his job calls for quite a bit of this . . . his grip is likely to contain the latest who-dun-it pocketbook.

The stocky, bespectacled scientist likes to relax in his basement workshop too. He's quite a hand with woodwork, made his own hi-fi set-up. His taste in music is rather catholic, he not only goes in for classical symphonies but, when he's in the mood, for rock 'n' roll stuff too.

Dr. Weiss is one of those persons who has a sort of ingrained boyish look about him but he's an intent individual who drives himself hard and doesn't like to fool around too much with the extraneous. No bullshooter, he.

Dr. Weiss has two daughters and a son. Despite his limited time, he is active in scout work and is a member of the vestry of the Arlington, Va., St. Mary's (Episcopal) Church.

Dr. Weiss has one weakness: flank steak marinated in soybean sauce, garnished with garlic.



**DR. PAUL SIPLE**  
Scientific Advisor to the Director of Army Research

**DR. SIPLE IS ONE** of the world's top polar experts but he's as warm a guy as you could ever hope to meet. His amiable effervescence would thaw a polar bear.

He's the kind of person who is always enthusiastic about something or other. Although best known for the fact that as a Boy Scout he accompanied Admiral Byrd on his first expedition to Antarctica and that he's since wintered there on a number of other occasions as well as making pioneer flights to the North Pole regions, he can get just as excited about the tropics.

As a matter of fact, he's something of an authority on tropical matters too. He is concerned with the extremes of natural phenomena, wherever it may occur, especially as it relates to the well-being of man and his equipment. He was instrumental in modernizing the entire concept of clothing, developing a clothing almanac which uses a color matching key to show what kind of apparel to wear in overseas climates anywhere in the world in any month. He is the inventor of the "Korean boot," the insulated shoe for cold-weather wear.

But Dr. Siple's scientific interest and curiosity is almost boundless. Right now, his pet enthusiasm is "COHN". This has nothing to do with any individual but stands for carbon-oxygen-hydrogen-nitrogen. He is convinced that the most momentous scientific breakthrough of all will involve these things, the basic, most common matter of this planet, that it is feasible by rearranging the molecules of simple earthy matter to create fuel, food and shelter to take care of all the needs of man in limitless abundance. He can talk for hours about this and is so convinced of all this that he tries to convert whoever he can into thinking along these lines.

Dr. Siple is a native of Montpelier, Ohio, spent his teen-age days in Erie, Pa., attended Allegheny College and Clark University. He makes his home now with his wife and three daughters in Arlington, Va.

He's probably just about the only private individual with his own wind tunnel. Of course, it's not as big as some but it's part of his home laboratory where he can lose himself for hours working on some private experiment or other of his.

Although he would be considered among America's foremost scientific men, he is still probably best known as the young Boy Scout who went to Antarctica and is always getting invitations to address some Scouting event or other.

Practically a chain smoker, the king-sized, extrovertish scientist is especially partial to corn on the cob but looks forward enthusiastically to almost any dish set before him. He is a baseball buff and likes to mow the lawn week-ends because he can catch the ballgames on radio while doing this. He is proud of the fact that his daughter Jane is attending one of the best-rated academic schools in the country, Wilson College, in Chambersburg, Pa., but he's aware of

something else about Chambersburg: That it's the home of Nellie Fox, Chicago White Sox second baseman.



**COLONEL ROY V. PORTER**  
Director of Plans and Management

**EXCEPT THAT HE** isn't so little, Colonel Porter might be described as the little man who isn't there. When the Army generals go up on the Hill to present their research and development budgets, it is the facts and figures and analyses of Colonel Porter that they are likely to be projecting. The stocky colonel's job is not only to tie together the various futuristic projects and programs but to do so under a practical budgetary roof.

To be able to justify expenditures on concepts and stratagems 10 to 15 years hence is not an easy job. Congress is often a pragmatic and next-election-minded body, and it keeps the colonel pretty much buttoned down to his desk. It has just about canceled out his hunting, fishing and golfing endeavors.

Colonel Porter budgets what leisure time he has to bowling (he's on a Pentagon bowling team) and puttering around the house. He is an excellent household manager, as you might imagine, and cuts financial corners by doing the painting and repair work around the house himself. He even built his own rec room.

The colonel considers Cedar Rapids, Iowa, his hometown but currently is making his home in Arlington, Va. Generally a personable individual, there is one sore point with him. Anyone who could tell him how to grow a healthy lawn of grass in Arlington would win his undying gratitude. Being from Iowa, the colonel considers not being able to raise a little green grass a fine how-do-you-do indeed.

Colonel Porter has three sons; Bruce, who is an Army lieutenant, John, a DePauw University student, and Roy, Jr., who is of grammar school age. The colonel's middle name is Vernon but he

would just as lief keep that knowledge in his "Secret" file.

Around the Pentagon corridors, Colonel Porter has the reputation of being an easy fellow to get along with but he can be pretty hard-headed when it comes to facts and figures, his stock in trade.



**COLONEL JOHN K. BOLES, JR.**  
Executive, Office of Chief of R&D

**COL. BOLES** is a sort of contradiction. He puffs on that meditative-looking pipe of his but he's really a very outgoing guy.

In fact, he's out-going all the time. He's a great camper. On reasonably decent weekends, he likes to bundle his wife, son and daughter, and, with station wagon and tent, hie himself off for the great outdoors. While stationed in Europe, he spent one leave camping out with his family all the way from Sweden to Italy.

The colonel, as you might suspect, is by way of being an avid fisherman and hunter too. Matter of fact, he's one of the most distinguished marksmen in the U. S. Army. He has a roomful of trophies and guns.

An able administrator, but an easy-going fellow for all that, nothing suits him better, when the occasion arises, than to be able to relax and talk about guns and such. His dad was a crack shot and cavalryman, too. While it appears that the colonel's son, John Keith III, was born a quarter of a century or so too late for the cavalry he's already demonstrated he too is quite a marksman. The 13-year-old boy has entered shoot tournaments in competition with people considerably older than himself and has more than held his own.

An "Army brat," Col. Boles was born in the Philippines, served as a platoon leader in both cavalry and armored forces, was a tank battalion commander during World War II. He's been on the go so much for the Army that it al-

ways startles him when people ask what he considers his hometown to be. "Last place I hung my hat, I guess," he says. Currently, this would be the District of Columbia.

Col. Boles has the fairish ruddy skin of his Scottish forebears. Also the clear, bright eyes that often goes with this. He's about as easy and affable an officer to talk to in the Pentagon or anywhere else.

Something of an oddity about him is that, unlike most outdoor men, he doesn't care anything about doing any cooking. He says he makes up for this though by eating more than his share of his wife's corn-on-the-cob and barbecued chicken, which, next to long-range, short-range rifle matches, is his favorite combination.



**COL. SHIRLEY** (the E is for Evert) was born in Grand Canyon. Well, not exactly in the canyon but the colonel avers, "It was darn close." Actually, he came into being in the canyon-oriented town of Grand Canyon, Ariz., where his dad was connected with the famed Harvey restaurant and other tourist enterprises.



**COLONEL JACKSON E. SHIRLEY**  
Chief, Technical Liaison Office

Unlike many others in his echelon, Col. Shirley is not a West Pointer. He attended the University of Arizona. The two most important sites in his life, though, do not include Arizona or the Grand Canyon; but Texas and New Mexico. In El Paso, he met his wife to be, Jane Grider, and at the New Mexico Military Institute he became indoctrinated into what you might say is his magnificent obsession . . . polo.

The slim, bespectacled colonel is about as passionate a polo player as you'll find anywhere these days. He likes to train his own "ponies" for the game, is a crack performer who invariably is on some team or other and quite often will go out of town to engage in a polo match.

In the winter, when polo playing is likely to be out of the question no matter how ardent about it you might be, Col. Shirley goes in for squash, generally using the courts in the Pentagon gym for this fast-and-furious handball-like game.

Something else the colonel goes in for is enchiladas. This, it turns out, is not a sport but a dish, Mexican style. He is quite a chef, both in the kitchen and outdoors at the grill, also has become adept at turning out tacos and chile con queso, a couple of other Mexican dishes. The colonel says that the secret of his culinary success, whether it's a Mexican or American-type concoction he's preparing, is that, whenever he's in doubt, he always tosses in some green peppers. "That always peps things up," he says.

Perhaps as much as almost anyone else in Army R&D, Col. Shirley has The Big Picture of what the outfit is trying to do. That's part of his job of course, to get the word out to industry and the public, but he seems to be just naturally a pretty lucid guy when it comes to explaining things. As a matter of fact, he could even garnish the conversation with a few words of Spanish here and there if he had to. ■







## Army Research Office

Army Research Office (ARO) long-range program planning is fixed on an unchanging purpose in the cal-dron of change fired by the swift surge of science. Though ARO's mission is constant—to help produce the superior weapons and techniques needed to win wars or preserve peace through poised power—functions border at times on scientific soothsaying supported by competent judgment.

While using every known resource to meet the critical requirements of the present, ARO's analysts must peer 10 to 20 years into the future. Sagaciously for the welfare of the Nation, they must anticipate what new scientific knowledge will insure continued technological supremacy related to Army needs for improved fire-power, mobility, communications and manpower.

In seeking to provide a dynamic research program responsive to Army requirements, ARO coordinates and cooperates with other defense agencies to minimize duplication of effort. ARO is concerned with converting the intangibles of scientific frontiers into discoveries pertinent to the problem of maintaining the Army's modern fighting force.

Established on 25 March 1958, by direction of Secretary of the Army Wilber M. Brucker, the Army Research Office is the result of a long-recognized need for a central monitoring agency with funding control of the Army's expanding, diffuse and complex scientific research program.

### EXTENT OF ARMY RESEARCH

Army research currently reaches into 74 subfields, involves more than 2600 research tasks, and is funded at about \$170,000,000 annually.

Approximately 21,500 civil service employees, supplemented by more than 2000 officers qualified as scientists and engineers and about 1500 enlisted technicians, are engaged in the Army's internal ("in-house") research activities. External activities, such

as basic research grants and contracts to colleges, universities, and other institutions or contracts with industry, employ several times as many scientists and technicians as the internal program.

Army research is conducted at 60 Army installations, in coordination and cooperation with 24 other Government agencies, by apx. 300 profit-making firms and over 100 nonprofit concerns or institutions. Well over 200 universities and colleges share in the program.

Extending into virtually every state, Army research activities reach also into 14 foreign nations through the European Research Office in Frankfurt, Germany. More limited operations are directed through the Far East Research Office near Tokyo, Japan.

Army research invariably is directed toward a military purpose. Results, however, frequently have by-product applications of great value to the civilian community. Benefits may range from improved medical practices to better materials for hundreds of daily needs, from more accurate weather forecasting to more efficient communications, from progress in transportation to atomic power plants or fuel cells.

### PROPOSAL PROCEDURES

The Army's research program accepts only one of every three to four proposals submitted. Selection of research tasks is complicated by the ever present hazard of leaving gaps in areas that might yield the most spectacular breakthrough—the revolutionary concept for new weapons that could establish decisive supremacy. Proposals of controversial merit, therefore receive the extra attention of ARO's staff of expert analysts prior to acceptance or rejection.

Decision on major research proposals does not rest solely upon the evaluations made by the ARO staff. As necessary, ARO seeks and uses the counsel of the top scientific talent obtainable. Numerous consultants

and joint committees share in deliberations. Advice on technical matters also is provided by the Army Scientific Advisory Panel, comprised of over 60 distinguished scientists, educators and industrialists.

#### DUTIES AND AUTHORITIES

In exercising General Staff functions of the Chief of Research and Development with respect to all Army research, ARO establishes and disseminates information on research goals to the Army's seven Technical Services. Approximately 90 percent of all Army research proposals are initiated within the Technical Services — Chemical, Engineers, Ordnance, Quartermaster, Signal, and Transportation Corps, and the Medical Service.

ARO also has jurisdiction over specially constituted Army research agencies such as the Human Resources Research Office at George Washington University, the Operations Research Office at John Hopkins University, the Special Operations Research Office at American University, and the Army Mathematics Research Center at the University of Wisconsin.

Backed by the conviction of Lieutenant General Arthur G. Trudeau, Chief of Research and Development, that "Man is always the most important, the ultimate weapon," the human resources research program has been expanding in recent years. Studies are aimed toward improved training methods, weapons and equipment designed for man-machine compatibility, and preparing the combat soldier to respond without panic to severe stress situations. Another objective is more effective utilization and selection of personnel by fitting them into jobs for which they are best qualified by acquired or potential skills.

#### BASIC RESEARCH

Under provisions of Public Law 85-934 enacted September 8, 1958, ARO has initiated a rapidly developing program of grants for basic research to non-profit institutions. Designed to simplify procedures for participation in the Army program, the grants system is being used to exploit more fully the scientific competence within colleges and universities. *Eventually most of the Army's basic research will be accomplished through grants.*

Basic research is defined as "that type directed toward increase of knowledge or science . . . where the primary aim of the investigator is a fuller knowledge or understanding of the subject under study." Applied or supporting research is directed toward practical applications of science, toward engineering and development.

*Ground Effects "air car" returns to shore after undergoing test. The machine rides on a cushion of air 6 to 10 inches off the surface of land or water.*



Basic research must be planned long in advance to outstrip the potential enemy. In the United States lead time from the spawning of a new concept to the development of a perfected new weapon may range from 7 to 10 years; in the Soviet absolute dictatorship system, lead time often is narrowed to five years.

Complicating the R&D cycle problem is the accelerated tempo of technology; obsolescence parallels progress in producing the sophisticated weapons of modern warfare. Currently the Army is spending about 25 percent of its total research budget on basic research, in the belief that emphasis on this phase is critical.

To shape the Army research program in consonance with the Nation's overall R&D effort, as well as with military objectives, the Army Research Office seeks to strengthen lines of communication with the general scientific community.

The Army Research Office arranges for conferences and scientific seminars sponsored or cosponsored by the Office of the Chief of Research and Development. Some 500 of the Army's top scientists and selected representatives of all the Federal Government scientific agencies participate in the biannual Army Science Conference, the next session of which will be held at the U. S. Military Academy 21-23 June 1961.

#### TASK SUMMARY

One of the principal tools used in informing the outside scientific community as well as all Federal Government scientific agencies regarding the status of Army research is the publication of the annual Army Research Task Summary (ARTS). In 1960 an 8-volume edition, containing over 3000 pages of highly condensed information, reported on more than 2600 tasks.

All unclassified volumes of the ARTS are sold to the public through the Office of Technical Services, Department of Commerce, Washington 25, D. C. ARO reports on automatic data processing and on ground effects machines, covering comprehensively all Government, industrial and private research, are scheduled for publication in the near future.

Organized into six divisions—Life, Physical and Environmental sciences, Human Factors Research, Operations Research, and Research Support—the *Army Research Office is headquartered at Arlington Hall Station, Arlington Hall, Virginia, about four miles from The Pentagon.* The civilian-military scientist team concept is demonstrated throughout the organization in all professional positions. Presently the staff consists of 33 officers, 27 professional civilians and 30 supporting personnel.

Particularly appropos to Army R&D is the "Time is of the essence" watchword. The Army Research Office strives to gear its functions toward teaming with development activities in the Office of the Chief of Research and Development to provide for combat troops *what they want when they need it.*

To paraphrase the popular vulgarism that stemmed from the victory formula attributed to a Confederate leader, Lieutenant General Nathan Bedford Forest, "I always make it a rule to get there first with the most men," the Army Research Office concentrates on program planning that will "get there fustest with the bestest." ■

# Army & Problems Guides for Industry

A series of seven *U. S. Army Research and Development Problems Guides* have been prepared for distribution to Industry.

Each of the Army's seven Technical Services has published a volume, which lists problems in science and technology with which the Army's Research and Development program are concerned. The solution of these problems can very substantially help this nation in its need to be as strong in the face of tomorrow's danger as it was on the battlefields of yesterday.

Lieutenant General Arthur G. Trudeau, Chief of Army Research and Development, announced plans for the compilation and distribution of these documents at a recent annual meeting of the Association of the U. S. Army.

In citing industry's invaluable contribution to the Army Research and Development Program, General Trudeau points out in the foreword of the U. S. Army Research and Development Problems Guides that they do not include complete systems which might be beyond the capabilities of any individual company.

Distribution of each volume of the Problems Guide is made by the appropriate Technical Service. Industry requests for copies must include proof of security clearance, if required, and a statement of the company's research capability in the field covered by the requested volume. Requests should be addressed to the following agencies:

## VOLUME I (SECRET)

Commanding General  
U. S. Army Chemical Corps

Research and Development Command  
Building T-7, Gravelly Point  
Washington 25, D. C.

## VOLUME II (CONFIDENTIAL)

Commanding General  
U. S. Army Engineer R&D Labs  
Fort Belvoir, Virginia

## VOLUME III (UNCLASSIFIED)

Commanding General  
U. S. Army Medical R&D Command  
Main Navy Building  
Washington 25, D. C.

## VOLUME IV (SECRET)

(Letter should be addressed to the Ordnance District closest to the addressor)

Commanding Officer  
Birmingham Ordnance District  
2120 North Seventh Avenue  
Birmingham, Alabama

Commanding Officer  
Boston Ordnance District  
Boston Army Base  
Boston 10, Massachusetts

Commanding Officer  
Chicago Ordnance District  
209 West Jackson Boulevard  
Chicago 6, Illinois

Commanding Officer  
Cincinnati Ordnance District  
Swift Building  
230 East Ninth Street  
Cincinnati 2, Ohio

Commanding Officer  
Cleveland Ordnance District  
Lincoln Building  
1369 East Sixth Street  
Cleveland 14, Ohio

Commanding Officer  
Detroit Ordnance District  
574 East Woodbridge  
Detroit 31, Michigan  
Commanding Officer  
Los Angeles Ordnance District  
55 South Grand Avenue  
Pasadena, California

Commanding Officer  
New York Ordnance District  
770 Broadway  
New York 3, N. Y.

Commanding Officer  
Philadelphia Ordnance District  
128 North Broad Street  
Philadelphia 2, Pennsylvania

Commanding Officer  
St. Louis Ordnance District  
4300 Goodfellow Boulevard  
St. Louis 20, Missouri

Commanding Officer  
San Francisco Ordnance District  
1515 Clay Street  
P.O. Box 1829  
Oakland 12, California

## VOLUME V (UNCLASSIFIED)

Commanding General  
U. S. Army Quartermaster Research and Engineering Command  
Natick, Massachusetts

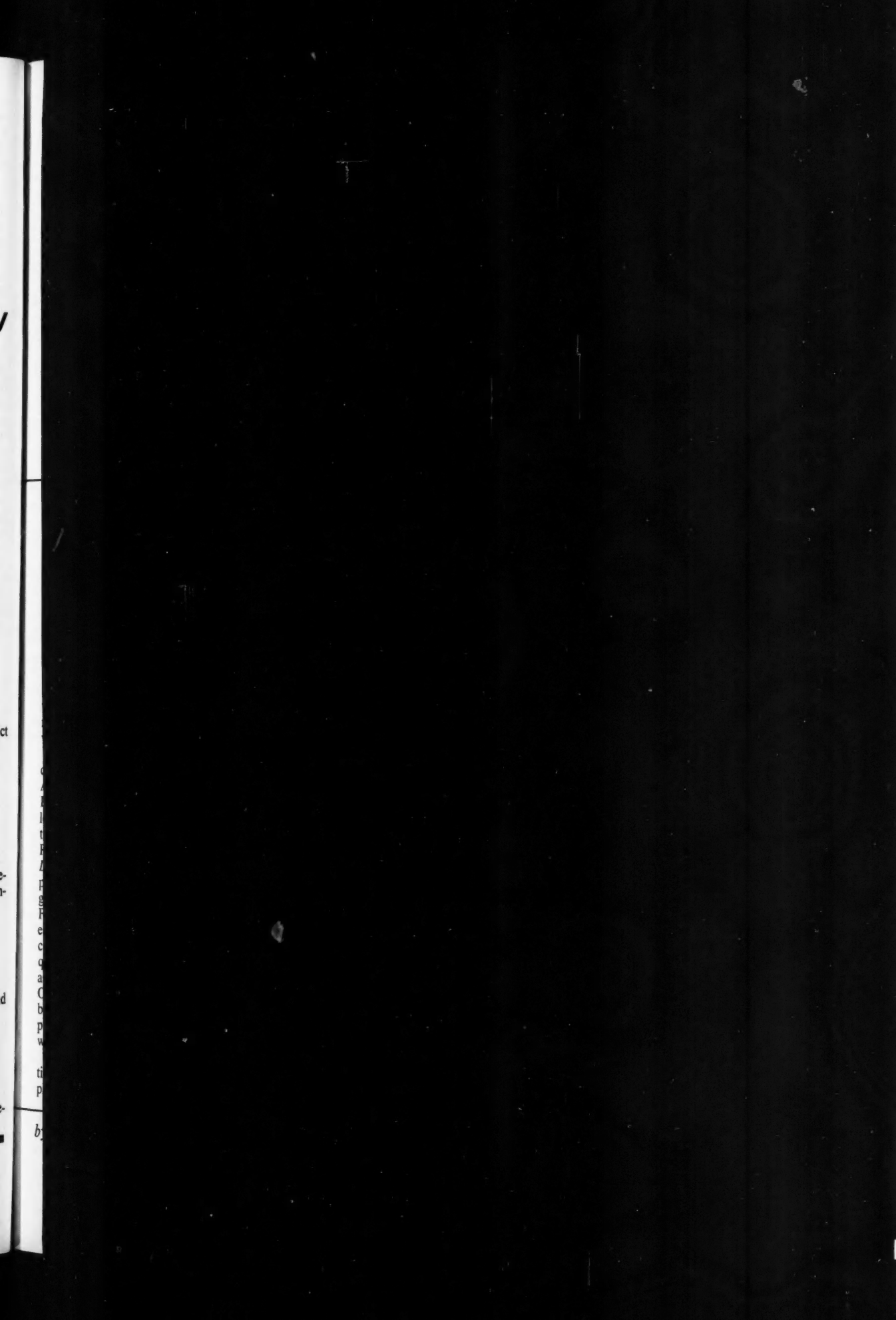
## VOLUME VI (CONFIDENTIAL)

Commanding Officer  
U. S. Army Signal Research and Development Laboratory  
Fort Monmouth, New Jersey

## VOLUME VII (UNCLASSIFIED)

Commanding General  
U. S. Army Transportation Research Command  
Fort Eustis, Virginia





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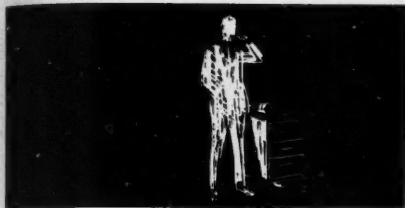
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## ... Straight talk to Sales Management

"PERSONALLY I'm really excited about what the effective utilization of one page unsolicited proposals could do. I've heard, I think, all the pros and cons. Frankly, I think ARDC deserves a fair shake from industry on trying to make this thing work. We're all on the same team really—and we all admit to having a problem in this area. I strongly suggest to all DATA readers that they advise their managements that in truth they have nothing to lose by a positive attitude toward this program, and may, in fact, find that they're on to a mighty useful device."

—Pat Thomas



## ARDC'S One Page Unsolicited Proposal...

it's really worth trying on for size

A FEW DAYS AGO I was actually reviewing an ARDC bulletin when I came across a most interesting ARDC plan which should save both the Air Force and its contractors time and money as well as provide several attendant advantages. As the title indicates we're talking about ARDC's experimental program for the submittal of voluntary short form proposals.

The document I was reading contains advance information about ARDC's revised Applied Research Planning Document (ARPD) Release Program which is now called the Technical Objective Document Release Program. As many of *Data's* readers are well aware, this program provides an invaluable guide to present and potential Air Force contractors by describing for each ARDC field of interest the capabilities that will probably be required in future time periods as well as outlining the Applied Research Objectives that must be obtained before these capabilities can be pulled together into operational weapon and support systems.

What struck my eye was the section on unsolicited proposals. These planning documents substantially

contribute to the direction of applied research efforts and as a natural consequence there is a stimulated increased flow of unsolicited germane proposals. The material on proposals proved so interesting that I decided to make this topic the subject of this month's article. To gain more information cognizant ARDC personnel were interviewed as well as several of my marketing colleagues.

ARDC's program for short form unsolicited proposals is now about one year old. It is an effort aimed at reducing the cost of preparing detailed voluntary unsolicited proposals, simplifying and expediting the evolution of these ideas by technical personnel responsible for conducting research on the areas concerned and to put it quite frankly . . . for economically checking out both sides of the fence.

### OK—How Can the Short Form Help?

The Air Force—as with the other service arms—is being snowed under in paper. It has been facetiously suggested by someone that the ultimate weapon for massive retaliation might be to drop the combined volume of contractors' proposals over the past few years on the enemy.

ARDC certainly doesn't want to cut down on the number of ideas presented . . . it continually urges

us to present fresh new approaches and never was this more important. The object of the short form is to increase this flow by sort of a venturi effect . . . increased rate of flow with reduced pressure.

The military does all of its business in one of two ways: (1) it solicits contractors formally through Requests for Proposals or (2) it awards contracts as a result of interest stimulated originally by the contractor. The expeditious handling of RFPs is indeed a sizeable chore. And I'm sure that you'll agree that these programs must get priority as they are part of the officially planned endeavor for which funds may already be programmed and a definite timetable for required action exists. More efficacious handling of unsolicited proposals facilitates this formal program.

Industry has been submitting unsolicited proposals of comparable bulk and cost to those which are in response to formal invitation. This has made prompt evaluation difficult. And more often than not the answer is: "We don't want it—we got it—thank you!" We, of the *Data* staff, are even more concerned about the lost technical time. When you take your car down the road for any length of time you usually regret the time lost more than the cost of

by Pat Thomas/DATA

the gas. And the stakes are much higher in defense research!

#### Use of the Short Form

Use of the short form (one page!) provides contractors with an expeditious, low cost method of assuring that the Air Force evaluates possible state of the art advancements. Definite responsibility for action is placed upon the cognizant ARDC Division or Center.

The ARDC criteria for evaluation will include but not be limited to the following important criteria:

- (1) Is the proposed work considered responsive to an established ARDC requirement and a significant advancement in the "state of the art?"
- (2) Is the advancement in a priority field of interest?
- (3) Is there funding available to support the program?
- (4) Are similar programs already funded?

Having access to these important answers at the earliest possible date is certainly basic to proper programming of a contractor's R&D and proposal effort. In most cases a 30-60 day reply can be expected which will not only provide this information but outline the next actions to be taken if interest exists.

#### How's the Program Faring?

At this point you are no doubt wondering about the success of this program over the past year. Unfortunately the acceptance of this plan has not been good. *The really sad thing is that the smaller contractors—the ones who need this most—haven't made more use of the device.* There are literally thousands of defense contractors whose contributions to defense are vital but which lack large well organized marketing staffs and whose overhead budget can support only limited study programs and proposal efforts.

The facts of life are that the larger contractors generally are more sensitive to the overall tenor of the defense market. They are in a better position to sense forthcoming procurements. And as a matter of basic philosophy, the military doesn't really intend to surprise anyone with a procurement. But it takes coverage in depth to really penetrate deeply over the whole spec-



trum of intelligence requirements and the smaller contractors have this real problem. Furthermore, and this is meant only in a constructive sense, it is quite true that the judgment of the smaller contractors may be less considered and mature for the above referenced reasons.

Now, let's also face this. These failings are not limited to the Small Business segment. ARDC recently evaluated one major defense contractor's recent history in unsolicited proposals. Out of 25 lengthy and detailed submittals—24 would have secured the same negative reply had these been of the one page type.

Perhaps the greatest deterrent to use of the short form proposal is the suspicion in the contractors minds that the short form proposal encourages a negative reply by making this action so much easier. After all, the larger the effort, the more consideration must be given it. Well, let's make one point clear—the short form can provide adequate information for ARDC to tell you whether more information should be supplied. Its purpose is for initial consideration. And it can work. ARDC states that in one case—admittedly an exceptional one—a contractor submitted three one-page proposals, at least two of which resulted in Purchase Requests.

#### Can You Sell A Program on This Basis?

No, you can't sell a program on this one-page basis alone, and you can with a full blown unsolicited proposal. The short form, as we've already stated does not provide for a full evaluation. And like any unsolicited proposal it does not obligate the Government to procure experimental or production quantities or to establish a confidential relationship beyond the terms of the Form 91 agreement which proposal submitters are required to sign.

So—why not just call up the proper agency and ask the cognizant official if he is interested in sponsoring your idea? Well, this would be OK in some cases. As a matter of fact, this is a fairly common function for a field representative. *The problem here is that this action commits no one to do anything; you have bypassed the system and have probably obtained only a moment's consideration. And I'm assuming you know the proper*

CHART I

#### Short Form Voluntary Unsolicited Proposal

PROBLEM:

SOLUTION PROPOSED:

ESTIMATED COST:

- |                                   |                             |
|-----------------------------------|-----------------------------|
| 1. What is Needed                 | 2. What is Already Invested |
| a) \$.....                        | a) \$.....                  |
| b) Facilities (Brief Description) | b) Facilities               |
| c) Equipment                      | c) Equipment                |
| d) Material                       | d) Material                 |
| e) Personnel                      | e) Manhours                 |
| f) Other                          |                             |

TIME REQUIRED: .....Months

PRINCIPAL INVESTIGATOR: .....

.....% of time available for this project

(In the event an Unsolicited Proposal is submitted as a direct result of ARDC Technical Objectives, a statement to this effect should be made in the proposal.)



ARDC Center and personnel to contact. This isn't always a very easy thing to determine and this is why ARDC suggests you use the ARDC Regional Offices or submit your proposal directly to Hq. ARDC Attn: RDMK-5.

So, while you can't sell your program on the basis of the short form, it is true that a positive expression of interest from the Air Force is an effective first step in the right direction. Chances are that you'll re-

page and paragraph on the face of an engineering study under consideration. Of course, in your company you may have a different name for the paper under which authority for internal research is released. It is suggested that the Chief Engineer or Director of Research decide whether a subject internal research program is suitable for use of the short form voluntary unsolicited proposal at the time of initial consideration as a research ef-

fortures, mainly due to the size of the effort required. *If you find a few programs which are currently part of your overhead program and succeed even in getting partial funding, you have taken some of the pressure off overhead, placed the research on a more businesslike basis and have raised your probabilities of future larger funding.*

4. Your idea must be a significant advancement to the state of the art, as it is competing with the estab-

## GUIDE FOR VOLUNTARY UNSOLICITED PROPOSALS

CHART II

Any organization or persons outside the Air Force may suggest a research and development effort.

### A. Qualifications

Usually the source of voluntary proposals should be technically qualified to carry through any program which they may suggest in the event it is favorably considered by the Air Force. However, the Air Force does not consider the supporting facilities of the organization or individual submitting a proposal in determining the technical merit of the proposal and its potential usefulness to the Air Force.

### B. Definitions

Voluntary proposals to perform research and development are distinguished from proposals which are requested by the Air Force from qualified sources. These latter proposals are prepared in response to a "Request for Proposal" which usually contains a clear statement of the objective on which the Air Force invites qualified sources to bid. Voluntary proposals are not solicited and therefore, have not been programmed by the Air Force as to funds and other necessary formal procedures used in the conduct of military research. Therefore, it is critical that a voluntary proposal should be a significant advancement in the present "state of the art."

### C. Advance Consultations

It is the desire of the Air Force to give an advance opinion on any proposed research and development effort voluntarily suggested by organizations and individuals outside the Air Force. This opinion will give guidance prior to the start of any extensive effort based on the assumption that there is a valid Air Force need for the suggested work.

### D. Regional Offices

It is not necessary to visit Hqs ARDC or the various centers of ARMC to present voluntary proposals and inventive contributions. ARDC has established regional offices located at central points throughout the country, as listed elsewhere in this book. Consultations at these regional offices with technical and administrative personnel should provide any additional required guidance. Arrangements may be made with the regional offices to forward voluntary, unsolicited proposals directly to the appropriate center.

### E. Inventions

Inventions are not considered to be in the same category as voluntary proposals which outline a research and development effort. Inventions, suggestions, articles, ideas, mechanical devices, or other known facts which are believed to afford an improvement in known machines, weapons, equipments, arts, methods, or systems, are the province of the National Inventors Council, U. S. Dept. of Commerce, Washington 25, D. C. The National Inventors Council may forward meritorious inventions to all the military services con-

cerned for evaluation. The National Inventors Council determines whether patented or unpatented inventions have possible military applications and obtains evaluations which are forwarded to the submitter.

### F. Contracts

The primary objective of voluntary proposals lies in determining how to schedule and utilize technical effort. If the short form is used effectively, the commitment of substantial financial and technical resources to any effort not considered useful to the Air Force will be avoided.

### G. Detailed Proposals

Detailed proposals should be submitted for a complete technical evaluation only if the submitter has received information from a short form proposal as to the potential usefulness of the proposed work to the Air Force. Information regarding floor space, machinery, and other data need not accompany the short form or any subsequent proposal unless specifically requested by technical personnel or procurement activities. There is no requirement for glossy-covered brochures since the technical merit of the proposal is the sole consideration once the potential usefulness to the Air Force is reasonably established. The needs of industry management require prompt response to any proposal; consequently, responses to the short form have been given high priority by ARDC personnel. Guidance is supplied to submitters of unsolicited proposals by ARDC, without obligation on the part of ARDC or the submitter, except as defined in ARDC Form 91.

### H. ARDC Form 91

ARDC Form 91 entitled: "Policy Agreement for the Evaluation of Articles or Disclosures" is a statement of the terms under which the ARDC will accept voluntary, unsolicited proposals. This agreement must be signed by an officer of the company, or the individual owning the intellectual property contained in the voluntary proposal. It is designed for the mutual protection of all concerned and provides protection based on proprietary claims made by submitters of voluntary proposals. This agreement is required to be signed only once and may be obtained from the Regional Offices, Centers, or at Hqs ARDC (RDMK). It will be filed in a central file at Headquarters, ARDC (RDMK). It is suggested that the first short form submitted should be addressed as indicated below and be accompanied by Form 91 signed in duplicate.

### ARDC (RDMK)

Andrews AFB  
Washington 25, D. C.

Subsequent proposals may be addressed directly to the applicable Center or Regional Office.

ceive information which will help you in slanting your full blown unsolicited proposal.

### Some Final Thoughts . . .

1. The internal research programs of Air Force contractors should be based largely on identifiable objectives within ARDC's fields of interest.

2. The proper Technical Objective and/or Applied Research Objectives should be referenced by

fort. Examine the chart showing the suggested format of the proposal. Isn't it true that your internal study orders already have almost all of the information required?

3. I would also suggest that you review your total existing and programmed internal research program for possible short form unsolicited proposal submittals. Perhaps you've refrained from a proposal effort on one or more programs, with military

lished programs being handled on an RFP basis.

In closing I would like to suggest that this program can succeed only through effective bilateral cooperation. ARDC has made its position and intent clear. It is suggested that a positive attitude from industry will prove to pay dividends to the military, the contractors and the taxpayers. Try it on for size, won't you? ■

# DATALOG OF MISSILE, SPACE, AND DETECTION PROJECTS

MILITARY MISSILES, OCTOBER 1960

\* New information this month

AA—Air-to-Air  
AS—Air-to-Surface  
AU—Air-to-Underwater

SS—Surface-to-Surface  
SA—Surface-to-Air  
SU—Surface-to-Underwater  
UU—Underwater-to-Underwater

ICBM—Intercontinental Ballistic Missile  
IRBM—Intermediate Range Ballistic Missile  
ECM—Electronic Countermeasures

## ARM WS-121B AF

Type: AS  
No contracts announced.

ARM is said to replace cancelled CROSS-BOW. Anti-Radar Missile.

## ARROW Army

Type: AS prime: Grand Central  
guide: stabilizing fins  
power: Grand Central Rocket

Launched from helicopter or medium-weight Army a/c, ARROW reaches alts of 120,000 ft. Enters target area vertically.

## ASROC Navy

Type: UU prime: Minn.-Hon.  
length: 15 ft. weight: 1000 lbs.  
guidance: stabilizing fins

Development cost \$65 million. Navy has 2 ships fully equipped with ASROC missile system. Plans call for total of 150 destroyers and cruisers with ASROC within 3 years.

## ASTER Navy

Type: SU prime: APL/Vitro  
guide: Ford range: 30 mi.  
power: Allegheny/Rocketdyne

Ship launched TERRIER carries ASW torpedo to surface destination, where torpedo drops off for attack. May replace SUBROC. Now in R&D.

## ATLAS SM-65 AF

Type: ICBM prime: Convair  
guide: GE/Burroughs/Am. Bosch  
power: North American  
nosecone: GE length: 75 ft.  
weight: 260,000 lbs. dia: 10 ft.  
range: 5500 naut. mi.

\* ATLAS squadrons will cost \$152 million apiece. FY '61 funding \$232.9 million. Army Corps of Engineers Ballistic Missile Construction Office (CEBMO), in LA now responsible for contract administration on ATLAS ICBM squadron construction at Plattsburgh AFB. Project funded at \$24 million. Eventually CEBMO will have responsibility for entire ICBM base construction program, funded at \$900 million for 24 squadrons at 18 bases.

## BOMARC IM-99A IM-99B AF

Type: SA  
prime: Boeing power: A—Marquardt  
guide: Westinghouse B—Thiokol  
funding: \$421.5 million on BOMARC-B in FY 61  
speed: Mach 2.7  
range: (A) 200+ mi. (B) 400+ mi.

\* FY '61 founding—\$20.1 million. BOMARC B flight of 14 Oct was longest to date, covering over 345 mi. Official nod from AF ok's BOMARC B for quantity production.

## BULLPUP ASM-N-7 Navy

Type: AS prime: Martin  
guide: radio command/Republic  
power: Thiokol

\* Improved radio command guidance for installation in BULLPUP platform a/c, the A2F, increases accuracy of this versatile missile. Westinghouse to build launch gear.

## CLAM AF

Type: AS power: Ramjet  
No contracts announced.

Chemical Low Altitude Missile listed in AF missile specifications book. Was in study and Research phase, may now have been cancelled in favor of SLAM.

## COBRA USMC

Type: SS  
prime: Boelkow Entwicklungler, W. Germany  
(distrib. U.S.: Daystrom)

guide: wire guided  
power: Solid BE speed: 191 mph.  
weight: 24.6 range: 1 mi.

Daystrom is turning out 1000 COBRAS a month for USMC.

## CORPORAL SSM-A-17 Army

Type: SS power: Ryan  
prime: Firestone speed: Mach 3.5  
guide: Gilfillan range: 85 mi.

Giving way to SERGEANT. Many CORPORAL birds being used as targets for NIKE family.

## DAVY CROCKET Army

Type: SS prime: Rock Island

\* FY '61 production funds: \$20.6 million. Production in substantial quantities is expected to commence early '61. DAVY CROCKET can be mounted on most combat vehicles, from Mechanical Mule to armored personnel carrier. experts feel that range is limited to 3 or 4 miles. Shell characteristics are classified, but educated estimates place weight at 50 lbs; caliber of 5 in; length of 30 in. Will be delivered to NATO in '61.

## EAGLE JAAM-N-10 Navy

Type: AA prime: Bendix  
guide: Bendix/Sanders/Westinghouse  
power: Aerojet speed: Mach 4  
frame: Grumman range: 100 mi.

\* Launched from subsonic "Missileer" a/c, EAGLE remains airborne for relatively long periods, capable of operating over long ranges and high altitudes. Dvlpmt cost est \$3 billion for "Missileer" program. Latest contract \$8,376,034 to Grumman from Bendix for production of missile airframe, propulsion system launcher, modification of a/c.

## FALCON GAR-1, -2, -3, -4, -9, -11 AF

Type: AA power: Thiokol  
prime: Hughes speed: Mach 2+  
guide: Hughes range: 5 mi.

GAR-3 is operational, SUPER FALCON GAR-3 in test. GAR-2 and 4 are infrared guided. GAR-9 is radar guided with nuclear warhead. Long range GAR-9 now being cut back in production. GAR-11 installed on F-102 Delta Daggers, giving them nuclear capability. F-102 will also carry GAR-10 and GAR-2A.

## GENIE MB-1 AF

Type: AA power: Aerojet  
prime: Douglas speed: Mach 4  
guide: Hughes range: 1.5 mi.

\* GENIE is pointed downward at launch, curves up at target. Replaced by guided FALCON missiles on F-101B and F-106.

## HAWK M-3 Army

Type: SA  
prime: Raytheon power: Aerojet  
guide: Raytheon range: 22 mi.

\* Belgium, France, Italy, Netherlands and West Germany have agreed to pool resources in producing HAWK missile systems for mutual use. Each of the 5 NATO countries will produce specified portions of the system. Latest US contracts: \$29½ million to Raytheon for production and engineering services; \$1.3½ million to Aerojet for rocket motors. FY '61 funding \$97.4 million.

## HONEST JOHN M31 Army

Type: SS prime: Douglas  
guide: unguided  
power: Hercules Powder/Thiokol

range: 15 mi.  
\* FY '61 funding \$22 million. SLIM JOHN (XM50) is improved model minus heavy nose. The XM-50 cuts ½ ton off weight, and 3 ft off length. Warhead is more powerful, both in the nuclear and non-nuclear versions. Range is increased by 15,000 yds.

## HOUND DOG GAM-77 AF XGAM-87A

Type: AS  
prime: North American  
guide: Autonetics  
power: Pratt & Whitney (J52)  
funding: \$170 million in FY '61  
speed: Mach 1.7 range: 500+ mi.

\* Using extra boost from HOUND DOG engines enables use of B-52 from smaller airstrips. Range of missile not affected, as HOUND DOG can be re-fueled from mother ship. 2 major studies now underway. 1. A study by NA to decrease radar reflection of missile, enabling it to sneak by enemy radar. 2. A feasibility study to explore possibility of mounting a weapon beneath HOUND DOG wings. \$10.6 million is funded for HOUND DOG in FY '61.

## PROJECT HYDRA Navy

Type: Sea launch platform  
Obj: Test feasibility of launching missiles from sea platform

Concept of spar buoy (vertical-floating) launch for large solid-propellant rockets.

## JUPITER SM-78 Army-AF-NASA

Type: SS prime: Chrysler  
guide: Ford Instrument  
speed: Mach 10  
power: Rocketdyne range: 1750 mi.

Contract with Chrysler expires April, '61. Rumored that Army may not renew.

## LACROSSE SSM-A-12 Army

Type: SS power: Thiokol  
prime: Martin speed: Mach 2  
guide: Federal Tel. range: 20 mi.

\* FY '61 production funding: \$8.4 million. LACROSSE is operational, now in Germany—with two battalions forming part of the NATO shield. It is multi-purpose in that it can be used against open troops as well as fortified targets. Latest award, 5.3 million from Martin to ITT for guidance system electronic computer components.

# DATALOG OF MISSILE, SPACE AND DETECTION PROJECTS

## MILITARY MISSILES, OCTOBER 1960

★ New information this month

2

### LITTLE JOHN Army

Type: SS  
prime: Emerson guide: unguided  
power: Hercules Powder  
range: 10 mi.

Limited operational use with troops. Funding for FY '60 \$38½ million.

### LOBBER Army

Type: SS range: 15 mi.  
Designed for attack and supply missions.

### LULU Navy

Type: AU prime: General Mills  
★ LULU atomic depth bomb is operational with the fleet, and ready for use. Production continuing at General Mills on large scale. Most details still highly classified. Carried by a/c and helicopter. LULU augments BETTY, first nuclear depth charge, and will ultimately replace it.

### MACE TM-76 AF

Type: SS prime: Martin  
guide: AC Spark/Goodyear  
power: Allison (J33-A-41)  
funding: \$39.8 million in FY '61. No renewal.  
range: (B) 1200 mi.

Request funding for MACE, FY '61 totals \$31½ million.

### MAULER Army

Type: SA  
prime: Convair guide: Raytheon  
Anti-missile missile for field use. Truck mounted. Second phase contract has been awarded to Convair: \$5½ million.

### MINUTEMAN SM-80 AF

Type: ICBM  
prime: Boeing guide: Autonetics  
power: Thiokol/Aerojet/Hercules Powder  
range: 6300 mi. nosecone: Avco

★ FY '61 funding \$291.2 million. Hard MINUTEMAN squadrons have an apx price tag of \$60 million per copy. AF now studying Ellsworth AFB as possible underground MINUTEMAN site. Latest award \$17 million to Thiokol for continued work on solid propellant engine production facility in Utah.

### MISSILE A Army

Type: SS  
prime: GE range: 70 mi.  
FY '61 funding \$5 million for components purchasing. MISSILE A may be combined with MISSILE B for economy. Nuclear head.

### MISSILE B Army

Type: SS  
No contracts range: 10-20 mi.  
No funding in FY '61. Missile for general support missions. Nuclear head.

### MISSILE C Army

Type: SS  
No contracts range: 70-90 mi.  
Similar to SERGEANT. In dvlpmnt.

### MISSILE D Army

Type: SS  
No contracts range: Over 500 mi.  
Now in early dvlpmnt.

### NIKE-AJAX SAM-A-7 Army

Type: SA  
prime: Western Electric  
guide: Western Electric  
power: Hercules Powder  
speed: Mach 2.5 range: 30 mi.

★ Work underway on conversion of 15 NIKE-AJAX sites to NIKE-HERCULES, protecting metro areas in U.S.

### NIKE-HERCULES SAM-A-25 Army

Type: SA  
prime: Western Electric  
guide: Western Electric  
power: Hercules/Thiokol  
funding: \$111.4 million in FY '61  
speed: Mach 3.2 range: over 85 mi.

★ Improved ground equipment permitted recent completely successful kill of NIKE-HERCULES by twin missile at 60,000 ft.

### NIKE-ZEUS XSAM-A-25C Army

Type: SA  
prime: Western Electric  
guide: Bell Telephone  
power: Grand Central Rocket/Thiokol  
range: 200 mi.

★ New tactical configuration, with fins forward rather than in the rear, proven successful. Small Thiokol rocket motor, powering final stage, successful in static test. Testing facilities for new NIKE-ZEUS now under construction at Pt. Mugu. Latest contracts: \$200 million to Western Electric for R&D; and \$60 million to Douglas from Bell for R&D.

### PERSHING Army

Type: SS prime: Martin  
guide: Bendix power: Thiokol  
range: 300 mi. (1000 mi.)

★ FY '60 funding \$131.6 million. Proposal by Martin to increase range (DATALOG Sept '60) has resulted in \$10 million R&D contract on 300 mi and 1000 mi version. PERSHING 2 estimated operational by '64. Regular 300 mi. version sched operational '63.

### POLARIS FBM Navy

Type: US-SS prime: Lockheed  
guide: GE power: Aerojet  
range: 1400 and 1750 mi.

★ POLARIS operational Oct despite 2 failures in firings from PATRICK HENRY. ETHAN ALLEN launch 22 Nov. France aiming at construction of 4 POLARIS subs, with probability of POLARIS purchase from U.S. Reborn estimates 1500 mi missile ready '62, 2500 mi version by '64. Total cost of \$8½ billion estimated for the planned 45 POLARIS subs with missiles.

### QUAIL GAM-72 AF

Type: AS-ECM prime: McDonnell  
guide: Radio command/Summers  
power: GE (J85) range: 200 mi.

Air-launched diversionary missile of extreme sophistication and complexity is valuable aid in protection of SAC bombers.

### RAVEN XASM-9 Navy

Type: AS  
No contracts announced.  
range: 500 mi.

Proposed air-to-surface missile now under study. Project appears to be lagging.

### REDEYE Army/USMC

Type: SA prime: Convair  
guide: Convair  
power: Atlantic Research

Lightweight (18 lb.) infra-red guided ba-zooka-type missile. Army has high hopes for this relatively inexpensive and effective, easily-carried guided missile that can be fired from a soldier's shoulder, giving him better anti-aircraft capability than ever before.

### REDSTONE SSM-A-14 Army

Type: SS power: Rocketdyne  
prime: Chrysler speed: Mach 5  
guide: Sperry Rand range: 250 mi.

★ Military test flight of 5 Oct described as "engineers' user test". Actually a MERCURY test shot. Look for nebulous name tags on MERCURY tests, to avoid panic of delay in case of failures.

### SERGEANT SSM-A-27 Army

Type: SS  
prime: Sperry power: Thiokol  
guide: Sperry range: 85 mi.  
FY '61 production funding: \$52.1 million.

### SHILLELAGH Army

Type: SS prime: Aeronutronics  
guide: Aeronutronics  
power: Picatinny Arsenal  
range: 8 mi.

Gyro for complex guidance system now being dvlpd by Telecomputing. Ideal for close-in support of troops.

### SIDEWINDER AAM-N-7 Navy GAR-8 AF

Type: AA  
prime: Philco guide: Philco/GE  
power: Hercules Powder  
range: 7 mi.

Extremely popular infra-red homing missile is simple and rugged. SIDEWINDER-1C is advanced model with higher speed and greater range. Advanced model has interchangeable warhead—one with infrared guidance (IRA), the other with radar guidance (SARAH). All weather type SIDEWINDER, to be used on PHANTOM-2 fighter, now in R&D. Even more advanced model "Super Side-winder" under dvlpmnt.

### SKYBOLT GAM-87A AF

Type: AS  
prime: Douglas power: Aerojet  
guide: Nortronics nosecone: GE  
range: 1000 mi., a/c launch

★ Static tests by Aerojet so far successful. \$50 million to be spent FY '61 on R&D. Possible increase to allow configuration changes. Latest award from Nortronics to Bell for miniature accelerometers.

### SLAM AF

Type: SS  
prime: Chance-Vought

Supersonic Low Altitude Missile, big Brother of CLAM. Chance-Vought selected as prime contractor. SLAM carries nuclear head.

### SLIM JOHN XM50 Army

Type: SS prime: Douglas  
guide: stabilizing fins  
power: Hercules Powder/Thiokol  
range: apx. 20 mi.

★ Advanced model of HONEST JOHN minus heavy nose. XM-50 trims ½ ton from HONEST JOHN M-31 model. 3 ft shorter. Explosive force is increased, as is range.

### SPARROW III AAM-N-6, 6A, 6B Navy

Type: AA guide: Raytheon  
prime: Raytheon range: 5-8 mi.  
power: Thiokol/Aerojet



# DATALOG OF MISSILE, SPACE AND DETECTION PROJECTS

## MILITARY MISSILES, OCTOBER 1960

### ★ New information this month

★ Longer-range SPARROW 6-B, now in dvlpmt, will have advanced power-plant, as rumored in last issue. Competition hot between Aerojet (solid & pre-pack liquid) and Rocketdyne (solid). Decision coming late '61.

#### SS-10 Army

Type: SS  
weight: 33 lbs. range: 0.9 mi.  
prime: Nord of France

Wire guided anti-tank weapon. Operational with U. S. and NATO forces. Used by the French in Algerian battles with success.

#### SS-11 Army

Type: SS  
prime: Nord of France  
weight: 62 lbs. range: 2 mi.

German order of 25,000 SS-11's require full production capability of Nord. Army will cease consideration of this anti-tank weapon in favor of COBRA.

#### SUBROC Navy

Type: SU-UU prime: Goodyear  
guide: Librascope/Kearfott  
power: Thiokol range: 25-50 mi.

This complex weapons system is launched through a torpedo tube of a submarine or surface vessel. Rising, it flies from 25 to 50 miles through the air, then re-enters the water and homes on its submerged target. Key to perfection of the system is reliability and range of built-in sonar equipment. Work is now continuing along that line.

#### TALOS SAM-N-6 Navy

Type: SA guide: Bendix/AVCO  
prime: Bendix power: McDonnell  
range: 75+ mi. speed: Mach 2.5

Unique in its integral ramjet body, TALOS is now operational aboard the guided missile cruiser GALVESTON.

#### TARTAR Navy

Type: SA prime: Convair  
guide: Sperry  
power: Aerojet/Rocketdyne  
speed: Mach 2.0 range: 10+ mi.

★ Production increased on TARTAR missile. Latest contracts; \$41½ million to Convair for TARTAR production, and \$2 million to GE for fire control directors. Will be primary armament of guided missile destroyers; secondary armament of guided missile cruisers. Improved TARTAR now in dvlpmt stage. Will have improved parts and higher energy solid propellant fuel.

#### TERRIER SAM-N-7 Navy

Type: SA prime: Convair  
guide: Sperry  
power: Allegheny/Rocketdyne  
speed: Mach 2.5 range: Apx. 12 mi.

★ Beam riding missile for use on larger surface ships. Operational with the fleet. Advanced TERRIER missiles now in increased production. GSE for TERRIER by Siegler.

#### THOR SM-75 AF-NASA

Type: IRBM prime: Douglas  
guide: AC Spark Plug  
nosecone: GE  
power: North American range: 1500 mi.  
★ Launch of COURIER 18, 4 Oct, was 100th shot of THOR; 73rd success. Hottest news this month is a proposal to AF and NASA for THORAD missile, a THOR with 3 addit

boosters on side of missile, automatically dropping off after burnout. Increase payload and performance.

#### TITAN SM-68B SM-68 AF

Type: ICBM prime: Martin  
guide: Bell/Am. Bosch/Sperry Rand  
power: Aerojet nosecone: AVCO  
range: 5500 mi./9775 mi. (Titan 2)

★ Corps of Engineers Ballistic Missile Construction Office (CEBMC) now has responsibility for TITAN missile base construction. Griffiss AFB selected as 9th support base for 18 underground launch sites. AF funding for TITAN in FY '61—\$409.4 million.

#### TYPHON Navy

Type: SA-SS range: 20 and 100 mi.

★ Now in flight-test stage of dvlpmt, this antimissile system is highly classified.

#### WAGTAIL AF

Type: AS prime: Minn.-Honey  
guide: Mirn.-Honeywell  
power: not releasable

This remarkable rocket will be able to follow contours of terrain and change speed in flight. WAGTAIL has been successfully sled-tested.

#### WEAPON ALPHA Navy

Type: SU No contracts released  
BuOrd "in-house"

Operational with the fleet, WEAPON ALPHA is rocket-powered depth charge now installed on destroyer escorts and class 931 frigates. The device will be replaced by semi-long range rocket-launched homing torpedoes, and is therefore already approaching obsolescence.

#### WHITE LANCE GAM-83A GAM-83B AF

Type: AS prime: Martin  
guide: radio command/Republic  
power: Thiokol

★ Larger model of Navy BULLPUP for AF use. Advanced version GAM-83B can carry nuclear punch. AF now dvlpng launcher to integrate BULLPUP into F-105 Thunderchief inventory of weapons. FY '60 funding \$6½ million.

#### WILLOW Army

Type: SS prime: Chrysler  
All information still highly classified.

#### ZUNI Navy

Type: AS-AA  
Fuze contract released to Bulova  
range: 5 mi.

Operational with carrier based a/c, ZUNI is a folding fin all-weather unguided rocket carried in multiple units. The Douglas AD a/c carry 48 ZUNIs below their wings on combat missions. The weapon is effective against pill-boxes, tanks, gun emplacements and small ships.

## SPACE PROJECTS

### PROJECT ADVENT Army

Type: Advanced Communications Satellite  
prime: No contracts announced  
Obj: Designed to be a global real-time repeater.

★ ADVENT has \$174 million for R&D. Basically same as PROJECT DECREE except for accelerated pace. Polar-orbiting satellites, such as PROJECT STEER and PROJECT TACKLE, may grow as off-shoots of PROJECT ADVENT.

Newly established PROJECT ADVENT Management Agency at Fort Monmouth is headed by B/G William M. Thomas, Jr. Latest contracts: \$1 million letter contract to STL Bendix won competition for ADVENT military active repeater communications satellite system.

### AEROS NASA

Type: Meteorological Satellite  
Obj: Designed to take pix of cloud formations and frontal systems.

Successor to NIMBUS, will be a 24 hour stationary weather satellite.

### AGENA AF/NASA

Type: Liquid-fueled Upper Stage  
prime: Lockheed  
Obj: AGENA will be useable as a second stage to ATLAS and THOR missiles. It incorporates a Bell rocket engine similar to that used previously in the HUSTLER vehicle. The AGENA upper stage is used in DISCOVERER, MIDAS and other projects. AGENA and SATURN are part of PROJECT TRIBE.

### AGENA B AF/NASA

Type: Liquid Fuel Upper Stage  
prime: Lockheed  
Obj: Deep Space Missions

ATLAS-AGENA B moon shot sched for mid '61. It will TV moon and land instrument capsule to tell NASA about the makeup of the moon. NASA will buy 16 Agena-B launch vehicles for \$50 million.

### APOLLO NASA

Type: Manned Spacecraft  
prime: No contracts announced  
Obj: Earth- or lunar-orbiting space lab for three men

★ Bids now in for feasibility design study contracts. 3 or 4 awards of apx \$250,000 will be let Nov. 14. Deadline for studies is May '61. Complete mission flights of APOLLO vehicles are tentatively scheduled for the 1965-1970 time period.

### ATLAS-ABLE NASA

Type: Large Booster  
prime: Convair/Space Tech Labs  
guide: GE/Burroughs/Am. Bosch  
power: Rocketdyne/Aerojet  
Obj: Designed to orbit 200-lb. satellite around moon.

2 ATLAS-ABLE shots are sched for late '60. Both aimed at lunar orbit. Project going well, with much interest in this combo.

### BLUE SCOUT (609A) AF

Type: Hyper-Environmental Test System  
prime: Aeronutronic  
guide: Minn.-Honeywell  
power: Aerojet/Allegheny/Thiokol  
Obj: Testing equipment and techniques; collecting scientific data at space equivalent altitudes in support of ARDC mission of advancing the state-of-the-art components, subsystems, and specialized methods related to future ballistic missile and military space systems.

★ Name has been changed from 609A to BLUE SCOUT. 4 stage model called SCOUT; 3 stage version called BLUE SCOUT I. With 4th stage guidance named BLUE SCOUT 2. BLUE SCOUT Jr is still another version, without guidance. First test flight of Jr. was firing success, but telemetry failure dampened spirits.



# DATALOG OF MISSILE, SPACE AND DETECTION PROJECTS

## SPACE PROJECTS, OCTOBER 1960

★ New information this month

### CALEB Navy

Type: Astronautics Vehicle  
prime: In House

Now entering instrumented test firing stage. Launched from F4D or F4H fighter a/c. Planned to launch small payloads into orbit. CALEB is planned as "a vehicle of potential operational use to the Fleet for recon, meteorological and other military missions."

### CENTAUR NASA

Type: Soft-Land Moon Vehicle

prime: Convair  
guide: Minn.-Honeywell  
power: P&W/JPL

1st stage: Hi-energy Atlas

2nd stage: 2 P&W liquid hydrogen engines

3rd stage: JPL 6000 lb. thrust liquid engine

Obj: Designed to land 730-lb. payload on moon in soft landing, for heavy earth satellites and probes to Mars and Venus.

Static tests underway in San Diego. Full firing due early '61.

### COURIER Army

Type: Communications Satellite

prime: Philco

Obj: Designed to be delayed repeater satellite, part of PROJECT NOTUS.

★ COURIER communications satellite now in orbit after successful launch with THOR-ABLE-STAR 4 October. Estimated to be operational for 1 year; in orbit for several years.

### PROJECT DISCOVERER AF

Type: Stabilized Satellites

Obj: Systems evaluation to include launching technique, propulsion, communications, orbital performance, advanced engineering tests and recovery techniques.

★ DISCOVERER 15 shot of 15 Sept successful. Orbit achieved, but capsule not recovered due to heavy seas. Summary of DISCOVERER series available from GE MSVD, Phila. Pamphlet PIB-52.

### DYNA-SOAR I AF/NASA

Type: Boost-Glide Orbiting Vehicle

prime: Boeing (for Glider)  
Martin (for Booster)

Obj: Manned glider for orbit and re-entry  
★ FY '61 budget: \$58 million. AF has also released FY '59 and '60 funds totalling \$29.7 million. Total cost expected to be over \$1 billion. Preliminary design contracts for large models have been awarded by AF to McDonnell a/c and Flight Sciences' Lab.

### PROJECT ECHO NASA

Type: Inflatable Satellites

Obj: Global communications experiment.

★ Continued use of ECHO 1 satellite for radio communications. ECHO 2 launch to follow.

### PROJECT FIREFLY ARPA

Type: Gas Research

Obj: Elimination of missile gas trails

★ Studies now underway to discover chemical properties of missile trails. These missile gas trails provide an excellent means for enemy detection of our missiles.

### JUNO II NASA

Type: Large Booster

guide: Ford Instrument

power: Rocketdyne/JPL

Obj: Attempts to put small payloads in space.

Project to be completed, 1960.

### PROJECT LORRAINE ARPA

Type: Basic research in energy conversion

Obj: Designed to stimulate the flow of fundamental knowledge of the conversion of energy into useful power sources and to support selected research in this field.

Through this project ARPA will extend early research, such as power for satellite programs, and review all ideas that have a potential in the conversion of chemical, nuclear and solar energy into power.

### MARINER NASA

Type: Space Vehicle

Obj: Planetary missions

Post MERCURY project, designed for planetary voyages. May weigh close to 50,000 lbs.

### MERCURY NASA

Type: Manned Satellite

prime: McDonnell

Obj: Will attempt to put man in brief orbit, then parachute him in capsule safely to earth.

power: ATLAS (Rocketdyne)

Continual delays and failures make sched launch date doubtful.

### MIDAS WS 117L AF

Type: Early Warning Satellite

prime: Lockheed

Obj: Infrared sensing of enemy ICBM launchings.

AF has \$41 million for MIDAS in FY '61. MIDAS would double our warning time of enemy ICBM launch, detecting heat from exhaust of missile as it is launched. ATLAS-AGENA vehicle will be used.

### NERV NASA

Type: Nuclear Emulsion Recovery Vehicle

prime: GE

Obj: Measurements of Van Allen Radiation belts

★ Initial flight of 19 Sept completely successful. ARGON D-8 was launch vehicle. More shots will follow.

### NIMBUS NASA

Type: Meteorological Satellite

Obj: Designed to take TV pix of cloud formations and frontal systems. Will be in polar orbit, earth oriented.

Total of 10 satellites will be launched through 1965—one every 6 months. THOR AGENA-B vehicles will be used. Improved components will be used as available. Invitations to bid will be issued soon.

### NOVA NASA

Type: Large Booster

prime: Rocketdyne

power: Rocketdyne

Obj: Will build 6-12 million lb. thrust booster for Outer Space

Rocketdyne's 1.5 million lb. thrust engine is heart of this system. NOVA will be cluster of 4-6 such engines. Engine in early development now, sched for operation after 1965.

### ORION AF

Type: Rocket propelled by nuclear pulses

prime: General Atomic

Obj: Nuclear powered Outer Space Vehicle

In basic testing stage. Apx \$2½ million spent to date.

### PIONEER 6 NASA

Type: Lunar Satellite

Obj: Achieve lunar orbit with 400 lb payload to measure radiation and magnetism in space, and other data preliminary to manned lunar landing.

★ Shot failed. Watch for rpt try soon.

### PONTUS ARPA

Type: Material Research

prime: no contracts announced

Obj: Experimentation and development of better structural and power conversion materials for military requirements in surface, air and missile programs.

Contracts awarded to Cornell, Penn, Northwestern Universities. Total funding through 1963; \$13.9 million, to establish, equip and operate labs. Additional labs may be set up at other universities at a later date.

### PRINCIPIA ARPA

Type: Solid Propellants

Obj: Developing new solid propellants with 10-20 percent higher specific impulses.

★ Project studies to be carried out by universities. Expect info on completed contract negotiations soon.

### PROJECT 609A AF

★ Name change. See BLUE SCOUT.

### PROSPECTOR NASA

Type: Lunar Probe

Obj: Soft landing of instruments on moon

### PROJECT RANGER NASA

Type: Lunar Probe

prime: JPL

power: NA/Hercules

payload: Aeronutronic

Obj: Hard landing of instruments on moon

★ Preliminary design studies completed at Aeronutronic for retrorocket. Allegany has award to build rocket. Expect total cost estimate next issue.

### REBOUND NASA

Type: Communications Satellite Network

Obj: Establish series of passive satellites for global communications.

These multiple passive satellites will be much like ECHO, succeeding that project.

### PROJECT ROVER AEC/NASA

Type: Nuclear rocket

Obj: Prove feasibility of nuclear rocket

★ Nuclear Propulsion Office (NPO), recently formed, is now responsible for ROVER program guidance. A joint office formed by AEC and NASA personnel. \$100 million in funds restored to project ROVER, bringing grand total of \$58 million in FY '61 funds. Will see nuclear power-plant by '63, rocket by '66.

### SAMOS WS 117L AF

Type: Reconnaissance Satellite

prime: Lockheed Obj: TV Satellite

★ As predicted last issue, SAMOS has received \$83.8 million to speed development. In a further attempt toward speedup, a special SAMOS office has been set in Pentagon as project overseer. Total FY '61 funding: \$283.7 million. Next SAMOS attempt expected Nov after 11 Oct failure.

### SATURN NASA

Type: Large Booster prime: Convair

power: Pratt & Whitney/Rocketdyne

Obj: Clustered 1.5 million lb. thrust booster for Outer Space Vehicles.

★ Redesign work has caused SATURN to fall 3 months behind schedule. Bids now in for automatic checkout system to be completed March '62. Look for award announcement next issue. Rocketdyne awarded \$44 million contract for development of 200,000 lb thrust engine.

# DATALOG OF MISSILE, SPACE AND DETECTION PROJECTS

## SPACE PROJECTS, OCTOBER 1960

★ New information this month

### SCOUT NASA

Type: Four-stage Satellite Launch Vehicle  
prime: Chance Vought  
guide: Minn-Honeywell  
power: Aerojet/Allegany/Thiokol  
Obj: Designed to place 200-300 lb. satellites in orbit.

First stage: Modified POLARIS

Second stage: Modified SERGEANT

Third stage: Antares

Fourth stage: standard VANGUARD 3rd stage.

★ See BLUE SCOUT for AF version. Launch of 4 Oct was successful. This was second successful flight for all-solid rocket SCOUT. The success came after a 2 week delay due to tech difficulties.

### SHEPARD ARPA

Type: Tracking System

Obj: Tracking and data reduction

System will detect and track satellites from Space Surveillance Control Center.

### SUNRISE ARPA

PROJECT SUNRISE will make studies of advanced military weapons with special concentration on space delivery.

### SURVEYOR NASA

Type: Lunar Probe

Obj: Soft landing of instruments on moon. Major piece of equipment will sample lunar crust, drilling as deep as 6 ft.

★ Expected to be going strong by '63, pending success of RANGER. Contracts have been let for preliminary design of spacecraft totaling \$500,000. \$150,000 in contracts have been let for design of lunar drill. Expect estimate of total cost next issue.

### TATTLE TALE AF

Type: Communications System

Obj: Determine the feasibility of using rockets to communicate over distances of several thousand miles in the event that enemy action destroys ground networks.

★ Tests underway at WADD, with a successful shot and transmission 31 Aug.

### THOR-ABLE NASA

Type: Large Booster

prime: Douglas/Space Tech Labs

Obj: Designed for deep space probes of lighter payloads than ATLAS-ABLE.

guide: GE

power: Rocketdyne/Aerojet

★ THOR-ABLE appeared to function OK in PIONEER 6 launch. Cause of failure not yet determined.

### THOR-DELTA NASA

Type: Satellite Launching Vehicle

prime: Douglas guide: ITT

power: Aerojet/Allegany

Obj: Designed to put small satellites (50-80 lbs.) into orbit around moon.

Successfully used as launch vehicle for TIROS 2 meteorological satellite.

### TIROS 2 NASA

Type: Meteorological Satellite

prime: RCA

Obj: Provide info on nature of weather

★ TIROS 2 shot expected soon. Watch for full report following launch. 21 nations, including USSR, have been invited to participate in TIROS 2 weather study.

### PROJECT TRANSIT Navy

Type: Navigation Satellite

prime: API/JHU

Obj: Earth satellite system to provide accurate all-weather navigation for surface ships, a/c, and subs.

TRANSIT 3-A scheduled to be launched November from Cape Canaveral. Will be another piggy-back shot. Two R&D TRANSIT satellites are presently in orbit: TRANSIT 1 launched 13 April 1960 and TRANSIT 2 launched 22 June 1960.

### PROJECT TRIBE ARPA

Obj: Outer Space Vehicles

PROJECT TRIBE is a research, experimentation and systems development designed to obtain at the earliest practical date a continuing family of military space vehicles capable of satisfying the needs for space missions as may be determined by Secretary of Defense from time to time. Guidance, stabilization and control components necessary to satisfactory performance of the vehicles shall be included in the scope of this assignment. SATURN and AGENA are part of Project TRIBE.

### VOYAGER NASA

Type: Advanced Spacecraft

Obj: Various planetary missions

More advanced craft than the planned MARINER vehicle.

### X-15 AF/Navy/NASA

Type: Rocket-Powered Manned Aircraft

prime: North American power: Thiokol

Obj: Designed to take man in controllable a/c to fringes of outer space—250,000 ft. altitude, at speed of Mach 5 (better than 3600 mph.).

FY '61 funding \$6 million for advanced development. Recent record flights: Alt—136,500 ft; speed—2196 mph. Flight with North American XLR-99 engine expected soon.

## DETECTION PROJECTS

### BALLISTIC MISSILE DEFENSE BMEWS AF

Type: Ballistic Missile Defense Radar System

prime: RCA

Obj: Ballistic Missile Early Warning System designed for 40-minute notice of approaching enemy ICBMs.

★ R&D cost of BMEWS—\$700 million. Production and construction costs will total \$180 million. Estimated total cost upon completion is \$1 billion. BMEWS Thule now in regular operation as is SAC's command post at Offutt AFB. Operational responsibility, for BMEWS Thule now officially transferred from AMC Hanscom to NORAD.

### PROJECT DEFENDER ARPA

Obj: Ballistic Missile Defense

★ Latest addition to PROJECT DEFENDER is PROJECT PRESS, (Pacific Range Electro-Magnetic Signature Study). The program has a classified radar system of advanced design and other sensing devices. PRESS is intended to investigate missile discrimination and identification.

### ESAR ARPA

Type: Advanced Warning Radar

prime: Bendix

Obj: Electronically Steerable Array Radar is designed for ground installation to warn of approaching enemy missiles. Multitude of individual cells will give more flexibility than other systems of steerable radar. Part of PROJECT DEFENDER.

### GLIPAR ARPA

Type: Study Group for Missile Defense

Obj: Designed to work on future ICBM defense. Called upon by DEFENDER and LONGSIGHT.

### PROJECT LONGSIGHT ARPA

Type: Study System in Missile/Space Field

Obj: Recommendations as to projects which should be initiated to satisfy future military requirements. GLIPAR (Guide Line Identification Program for Anti-Missile Research) which was initiated. GLIPAR is now used by both LONGSIGHT and DEFENDER. LONGSIGHT more advanced than DEFENDER.

### PINCUSHION ARPA

Type: Advanced Radar prime: Raytheon

Obj: PINCUSHION is a many-frequency radar installation to be located on Kwajalein in the Marshall Islands, initially, as an early warning radar, more variable than TRADEX or ESAR.

### SAGE AF

Type: Semiautomatic Ground Environment System

prime: IBM

Obj: Provides a push-button missile defense utilizing a search radar system to locate enemy aircraft and destroy them with BOMARC missiles.

### PROJECT SPASUR ARPA

Type: Space Surveillance System

prime: NRL/Bendix

Obj: To produce a system capable of detecting, identifying, and determining orbits of non-radiating objects in space.

The feasibility and operational capability of SPASUR has been demonstrated. A need now exists to increase the detection range and data handling capability of the system.

### PROJECT TEEPEE Navy

Type: Long Range, High Frequency Radar

Obj: Provide ICBM detection

### TRADEX Army

Type: Advanced Radar

prime: RCA

Obj: TRADEX is a modification of the radar types designed for BMEWS. It has better range.

★ Latest contract, \$1½ million to RCA for R&D. The award came after transfer of TRADEX from ARPA to Army.

### VELA ARPA

Obj: Research, experimentation and systems development related to the nuclear test moratorium.

VELA Uniform: R&D on sub-surface nuclear explosion detection. Funding for FY '60: \$8,535,000.

VELA Sierra: R&D on ground detection of nuclear explosions in space. Funding for FY '60: \$1,050,000.

VELA Hotel: R&D on satellite detection of nuclear explosions in space. Funding for FY '60: \$300,000.

★ Seismic research station at Fort Sill, Okla. in the Wichita Mts, has been completed. Will follow mission set down by recent Conference of Experts, in Geneva; to "Study the possibility of detecting violation of a possible agreement in the suspension of nuclear tests".

# Company Needs and Contacts

## An explanation of this feature:

In the interest of having more manufacturers, suppliers, and individuals share in the American Defense Effort, DATA magazine offers free advertising space to our prime contractor paid subscribers to tell their materiel and personnel needs to subsystem producers, subcontractors, jobbers, military personnel looking for civilian employment with Government-contracting industries, and personnel employed in other companies who might make better use of their abilities in the common defense.

There is no charge for these listings to paid subscribers in major companies. Space is allocated on a first-come first-served basis. A new listing must be submitted by the prime contractor each month as old listings will not be carried over.

- **CONSOLIDATED VACUUM CORPORATION**  
2030 16th Street North  
Arlington 1, Virginia  
Phone: JACKSON 5-1442

### Personnel Needs

#### Contact

L.B. Buraks  
Field Engineer

1. High Vacuum Equipment Sales Engineer - to relocate

- **DECCA NAVIGATOR SYSTEM, INC.**  
1028 Connecticut Avenue, N.W.  
Washington, D.C.  
Phone: District 7-5986

### Personnel Needs

#### Contact

T. D. Johnson,  
Vice President

1. Engineer-Purchasing Agent Electronic Components

- **EMERSON RADIO AND PHONOGRAPH CORP.**  
1140 East West Highway  
Silver Spring, Md.  
Phone: JUniper 8-7273

### Personnel Needs

#### Contact

Mr. Paul G. Hendrickson,  
Industrial Relations Officer  
Ext. 222

1. Three (3) Electronic Engineers or Physicists, with experience in ECM, ECCM, Altimetry, and Microwave Circuitry.
2. One (1) Production Engineer to supervise a group which will be concerned with Product Design, Methodizing, and Tooling of Electronic and Electro-Mechanical Equipment.
3. One (1) Test Engineering Section Chief, BSEE with 10 years electronic design and production testing experience.
4. One (1) Quality Control Section Chief, Engineering Degree, 6-8 years experience in design and quality control.

- **HAMILTON STANDARD DIVISION**  
**UNITED AIRCRAFT CORPORATION**  
Bradley Field Road  
Windsor Locks, Connecticut

### Personnel Needs

#### Contact

Personnel Department  
Hamilton Standard Division  
United Aircraft Corporation  
Bradley Field Road  
Windsor Locks, Connecticut

1. Supervisor, Data Processing
2. Supervisor Guidance and Control
3. Supervisor, Electronic Guidance
4. Supervisor, Inertial Guidance
5. Supervisor, Control Systems
6. Supervisor, Economics

- **THE NATIONAL CASH REGISTER COMPANY**  
Government Sales Division  
1217 K Street, N.W.  
Washington 5, D.C.  
Phone: STerling 3-3335

### Personnel Needs

#### Contact

Mr. Gordon Lennon  
Assistant Manager

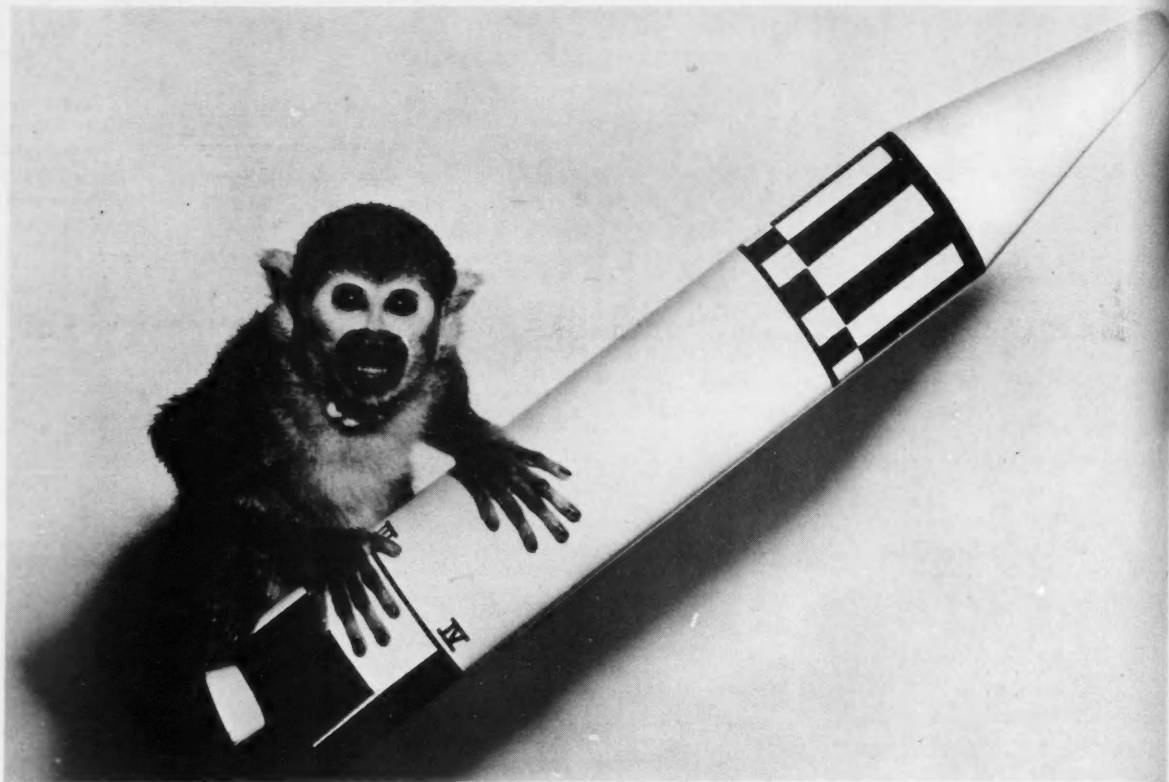
1. Programmer - Basic knowledge of punch card equipment through IBM 650

- **RAYTHEON COMPANY**  
P.O. Box 636  
Santa Barbara, California  
Phone: WOODland 7-5511

### Personnel Needs

#### Contact

Dave Gossman, Personnel, Ext. 152  
William F. Riordan, Manager of Sales, Ext. 550  
1. ECM Product Sales Manager



Space Monkey "Baker," passenger, with model rocket (Official U.S. Army photo)

## PROBLEM CHILDREN ARE OUR BUSINESS

From the troop-carrying Weasel of World War II to the safe re-entry of space travelers Able and Baker, meeting the advancing needs of our warriors and wanderers has been an important concern of Studebaker-Packard Engineering.

The nose cone that brought the space monkeys back through the atmosphere, for example, was developed and built by S-P's Cincinnati Testing Laboratories division, which specializes in organic, organic-ceramic and organic-metallic coatings. In other areas lie the experience of S-P's Gering Products division in structural plastics, and that of the Gravely Tractor and Clarke Floor Machinery divisions in the design and application of both gasoline and electrical, propane and battery-driven motors. S-P's Onan division is a famous maker of electrical generators and gas or Diesel power plants up to 130 KW. The long Special Vehicle record of our Automotive division is well-known. Such wide experience may help solve a variety of problems you face today.

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HOW HIGH ARE THE MOUNTAINS?

HOW DEEP ARE THE VALLEYS?

IS THE TERRAIN SMOOTH  
OR RUGGED?

HOW TALL  
ARE THE BUILDINGS?

MADE BY QUALITY THROUGHOUT THE WORLD  
**ADMIRAL**

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Under U. S. Army  
Signal Corps Contract  
**ADMIRAL** is providing an-  
swers to the questions  
shown above and others.

While travelling at high speeds  
and high altitudes, the **ADMIRAL**  
Ground Profile Recorder will give the  
heights of mountains or buildings, lo-  
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valleys and other pertinent facts about  
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discernable in aerial photographs.

Installation of this equipment in unmanned  
vehicles gives our Armed Forces far greater  
surveillance capabilities than have ever been pos-  
sible before.

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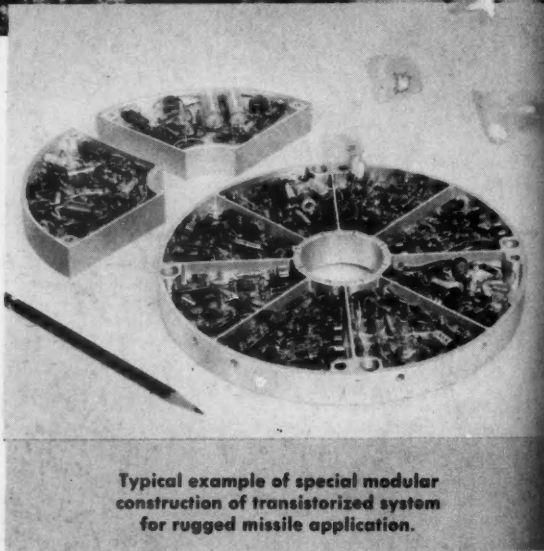
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